PLAN OF WORK

A USDA RIVER BASIN STUDY

SAN JOAQUIN VALLEY BASIN

PREPARED BY THE

UNITED STATES DEPARTMENT OF AGRICULTURE
RIVER BASIN PLANNING STAFF
BERKELEY, CALIFORNIA

ECONOMIC RESEARCH SERVICE FOREST SERVICE
SOIL CONSERVATION SERVICE

in
Cooperation with
The California
DEPARTMENT OF WATER RESOURCES

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TABLE OF CONTENTS

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SAN JOAQUIN VALLEY BASIN
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Introduction

The California Department of Water Resources has requested the U.S. Department of Agriculture, under Section 6 of PL 83-566, to conduct a Type IV River Basin Survey in the San Joaquin Valley Basin. Funding is available through the Agricultural Appropriations Act for fiscal year 1972.

Specifically, this survey will serve to identify opportunities for improvements in the use of water, land, and other resources which are intimately related to economic, social, and environmental influences which might be made primarily with the assistance of projects and programs of the U.S. Department of Agriculture intended for such purposes. Therefore, a major part of the survey will tend to focus on potential developments where a strong combination of local-state-federal cooperation and coordination will make maximum use of such activities as: the national soil and water conservation program; small watershed protection and flood prevention program; resource conservation and development projects; rural areas development programs; Rural Environmental Assistance Program;[1/] Farmers Home Administration loans; National Forest Multiple Use Programs; Federal-State Cooperative Forestry Programs; water development investigations under the State Water Resources Law of 1945; the California Watershed Protection and Flood Prevention Law; the Davis-Grunsky Act; Resource Conservation District programs and many others. Recommending priorities and timing of program and project use is highly important to success of the survey and the installation of works of improvement. Past studies in the Basin will be relied upon for information and data.

[1/] Funding terminated December 22, 1972.

The Basin is one of the most productive agricultural areas of the Nation, with agriculture and related industries accounting for over one-half of all jobs. The valley portion has excellent and extensive soil resources, a long growing season, but is deficient in rainfall. The Basin also has vast timber, wildlife, recreation, and rangeland resources.

The multiple use and management of water, land, capital, and labor together with wildlife, timber, recreation, rangeland and agriculture has created many complex inter-relationships and problems. The California Region Comprehensive Framework Study identified several land and w ater resource problems. Additional problems and needs will be identified during public meetings with local decision makers. Therefore, the evaluation of resource problems and the programs to alleviate these problems will be conducted under a multi-objective planning concept.

The study will concern itself with the general problem of conserving, developing, and allocating limited natural resources among alternative uses so as to maximize net benefits to society. The over-all purpose of water and land resource planning is to reflect society's preference for attainment of the following objectives:

A. To enhance national economic development (NED) by increasing the value of the Nation's output of goods and services and improving national economic efficiency.

B. To enhance the quality of environment (EQ) by management, conservation, preservation, creation, restoration, or improvement of the quality of certain natural and cultural resources and ecological systems.

C. To enhance regional development (RD) through increases in a region's income, increases in employment, and improvements of its economic base, environment, quality of life, and other specified components of the regional objective.

The Basin plays a major role in the California Water Plan. Many of the major watersheds and reservoirs, which are important sources of water for the San Francisco Bay Area and agriculture in the valley, are located on the eastern slopes of the Basin. In addition, a major portion of the water diverted from the Delta is used by agriculture in the valley.

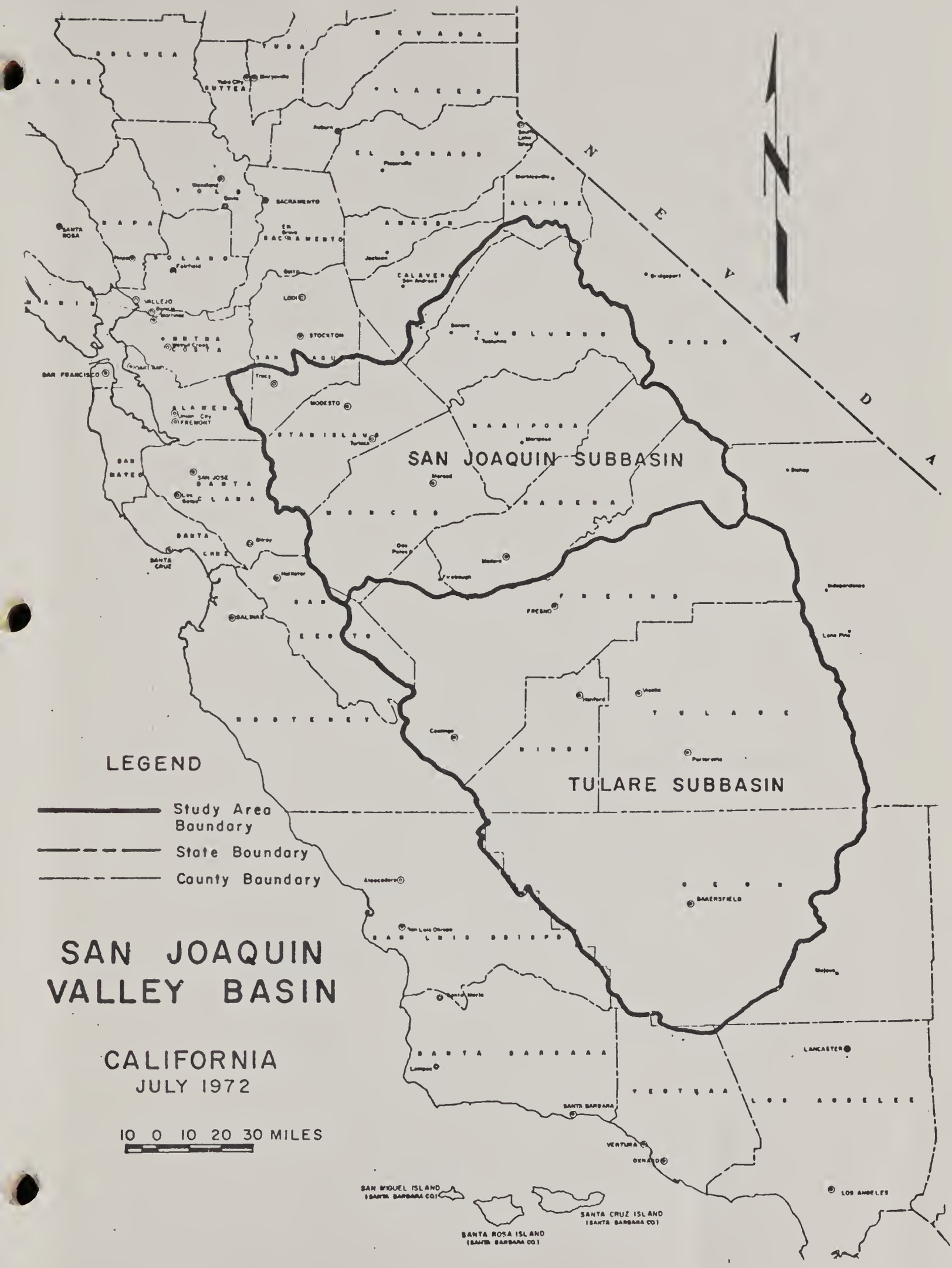
The economic base of the Basin will be significantly affected in the future by the importation and exportation of water. Much of the Basin's six million acres of irrigated agriculture, projected to 2020, will require: (1) improved agricultural management to utilize water and land resources more efficiently; and (2) drainage improvements to achieve and maintain the salt balance and provide adequate drainage. The economic feasibility of drainage improvements will depend upon future cropping patterns, resource availability, cost and use, prices of crops, and the management of drainage effluents. The economic base will also be affected by the natural resources

in the upland watersheds. Adherence to good environmental practices will be needed to insure continued desirable surroundings and a stable economic climate for the Basin's 1.4 million people.

All of the above considerations will affect the use of the natural resources in the Basin. Therefore, it is in the best interest of the people of the Basin and State to study the natural resources and to identify the present uses and plan for future uses. To do this, it is necessary to identify the problems caused by inter-related resources use and to develop a range of solutions to these problems.

Description of the Basin

The San Joaquin Valley Basin is located in the Central Valley of California and consists of the San Joaquin Subbasin and Tulare Subbasin. The Basin extends from near Stockton on the north to the Tehachapi Mountains on the south, and from the crest of the Sierra Nevada on the east to the crest of the Coast Range on the west. There are about 28,372 square miles or 18.2 million acres in the Basin. The San Joaquin Subbasin drains through the Sacramento-San Joaquin Delta into San Francisco Bay. The Tulare Subbasin is a closed basin.


SAN JOAQUIN SUBBASIN
TULARE SUBBASIN
LEGEND
Study Area Boundary
State Boundary
County Boundary
SAN JOAQUIN VALLEY BASIN
CALIFORNIA
JULY 1972
10 0 10 20 30 MILES
SAN FRANCISCO
SACRAMENTO
STOCKTON
MODESTO
FRESNO
BAKERSFIELD
SANTA BARBARA
LOS ANGELES
LANCASTER
VENTURA
SAN MIGUEL ISLAND (SANTA BARBARA CO.)
SANTA ROSA ISLAND (SANTA BARBARA CO.)
SANTA CRUZ ISLAND (SANTA BARBARA CO.)

The climate in the valley is characterized by hot, dry summers and mild winters with relatively little precipitation. Cool summers and cold winters with heavy rain and snow occur in the eastern mountainous areas. Average annual precipitation varies from about five inches on the valley floor to over 70 inches in the Sierra Nevada Range. Temperatures normally range from winter lows well below zero in the eastern mountains to summer highs of more than 115 degrees on the valley floor.

Mean annual runoff ranges from about 40 inches at the higher altitudes in the Sierra Nevada to less than 1/2 inch in the valley. The streams draining areas of high altitude in the Sierra Nevada have the bulk of their runoff as snowmelt in the spring and early summer, and almost 60 percent of the runoff generally occurs during the months April through June. The streams draining the Coast Ranges and the foothills of the Sierra Nevada have the bulk of their runoff immediately following the storms of winter and early spring, with the result that about 90 percent of the runoff occurs in the months December through April.

The following tabulation shows the acreage of the major vegetal cover types in the Basin.

Vegetal Cover	Acres
Forest	7,792,000
Range	4,429,000
Cultivated Crops and Pasture	5,134,000
Other Types	737,000
Total Land Area	18,092,000

About one-third of the Basin is in public ownership, principally in the mountainous areas. The remaining two-thirds is privately owned and mostly in the valley and foothills.

The major 1965 land administration or ownership acreages are shown in the following tabulation.

Land Ownership/Administration	Acres
Federal Lands	
Department of Agriculture	3,416,000
Department of Interior	2,474,000
Other Federal	103,000
State Lands	108,000
Other Public Lands	232,000
Private Lands	11,759,000
Total Land Area	18,092,000

Land use is highly varied and ranges from exclusive use to multiple use. Because of multiple use some double accounting occurs in the following tabulation. For instance some of the acreage accounted for in Timber Production is also counted in Undeveloped Recreation. This results in the total land use acreage exceeding the official acreage of the study area.

Land Use	Acres
Irrigated Cropland	4,347,000
Non-Irrigated Cropland	177,000
Grazing	7,204,000
Timber Production	1,502,000
Developed Recreation	212,000
Undeveloped Recreation	7,675,000
Wilderness	1,447,000
Natural Areas	227,000
Mineral Production	20,000
Urban and Industrial	171,000
Military	70,000
Transportation and Utilities	257,000

The population of the Basin exceeds 1.4 million and is scattered throughout the valley. The major cities are Fresno, Bakersfield, Merced, Madera, and Modesto.

In 1965 there was a total employed labor force of about 340,000. The major employers were agriculture and forestry (31 percent), wholesale and retain trade (24 percent), and manufacturing (15 percent). The unemployment rate in 1969 averaged a little over 7 percent and reached 12.1 percent for Stanislaus County as compared to the State average of 4.6 percent.

One-third of California's farmlands and farms are in the Basin and account for about 42 percent of the total cropland harvested in California. The gross value of agricultural output from the Basin in 1970 was $1.7 billion.

The gross income from timber sales and from the sale of finished wood products based on 1965 dollars and conditions averages about $25.5 million annually. It is estimated that hunting, fishing, and recreation in the National Forests contribute a gross annual income of $52.4 million in the Basin.

In 1968, Fresno, Kern, and Kings Counties produced petroleum worth over $300 million and natural gas worth $67 million. The Basin accounts for about 38 percent of the petroleum and 28 percent of the natural gas produced in California.

Highway, rail, and air transportation facilities afford ready access to parts of the Basin. The remainder of the Basin is served by a system of State, county, and forest highways. Access to sea transportation is by way of the Port of Stockton and shipping facilities in the San Francisco Bay Area.

Problems and Needs

A comparison of the present uses and future demands for water and related land resources to the available supply of these resources is needed to achieve maximum efficiency in the application of governmental and private programs.

The recently completed California Region Comprehensive Framework Study identified the following land and water resource problems in the Basin. Additional problems and needs will be identified during public meetings with local decision makers early in the study.

Problem	Acres
Agricultural Drainage	330,000
Agricultural Irrigation	2,150,000
Flooding	682,000
Average Annual Wildfire Losses	35,000
Erosion	382,000

Agricultural Drainage

There are 330,000 acres of irrigated lands requiring project drainage improvements. These improvements are needed in order to achieve salt balance and relieve high water table conditions which are currently limiting soil productivity and the variety of crops which may be grown. Department of Water Resources reports indicate 1,700,000 acres will be affected when all irrigable lands are developed.

Many problem areas currently in small grains and pasture production will be capable of growing more profitable crops such as alfalfa, row crops, and orchards when drained. This marked change in land use can be expected to increase employment and improve the local economy.

Agricultural Irrigation

About 2,150,000 acres of irrigated land currently needs additional water control facilities, crop water use data, and soil moisture monitoring to achieve timely and efficient irrigation. Soils need to

be identified according to their capabilities for agricultural use to improve their management.

Flooding

About 682,000 acres are flooded annually. Most of these flooded areas sustain damages through soil erosion, crop loss, sediment deposition, and infestations of weeds and plant diseases. About 3% of the area flooded is urban land with losses to residences, businesses, and utilities. The flood plain for the 1% chance (100-year event) includes 1,117,800 acres.

Wildfires

Most of the 35,000 acres damaged annually by wildfires are in the foothill and mountainous portions of the Basin and adversely affect grazing and timber resources through erosion and sedimentation. Other damages such as loss of wildlife habitat and protective vegetal cover of the watersheds are often significant.

Erosion and Sedimentation

Currently there are serious erosion problems on approximately 382,000 acres of the terrace, foothill, and mountainous portions of the Basin. Losses from erosion are mainly to the productive capacity and aesthetic quality of the land. The production of sediment from these areas contributes to the downstream sedimentation of urban and agricultural lands and the loss of storage capacity in reservoirs.

Fish and Wildlife Habitat

The Basin is an important fishery resource in the State. Problems concerning this resource include the inability to satisfy fishing demands, the effects of water resource development upon spawning

areas, resource enhancement problems, and problems of access to and management of the resource and the prevention of further losses of habitat. Inadequate stream flow due to damming or diversion has produced a hostile spawning environment in some of the streams in the Basin. This has particularly affected the salmon and steelhead runs -- completely eliminating one salmon run in the San Joaquin River. Rehabilitation of these streams is needed. Trout fishing demands have exceeded the stocking rate in many streams resulting in the need for controls over the fishing pressures and increased supplies of fish. There is also the problem of how to develop the fishery potential of the new stream habitat that has been created in the canals and aqueducts in the valley.

Game birds and big game, primarily deer, are major wildlife resources in the Basin. Problems that need to be solved are associated with the ability of these resources to satisfy hunting demands, the opportunities for increasing game populations, and the possibilities of improving habitat and game management. Other problems include ways and means of better utilization of game through better laws, law enforcement, and improved access. Waterfowl wintering habitat needs to be maintained free of the botulism that has been prevalent in the Tulare and Buena Vista Lakes, and Los Banos Area during years of extensive shallow flooding.

A deer range degradation problem is prevalent throughout the lower foothill area of the Sierra Nevada and studies are needed to determine how this range can be improved.

Timber and Grazing Management

Because there is a projected shortage of timber products and forage for grazing (see Land Resources and Use Appendix - California Region Framework Study), there is a need to analyze the present and future supplies of these resources and, if possible, to design programs to increase productivity. Such programs might be designed to promote better management of these resources or to bring new areas into production or both, including better multiple use for wildlife and recreational use.

Recreation

The Basin is within an easy drive of the two biggest population centers on the west coast; the San Francisco Bay Area and the Los Angeles Area. Many private and public recreation facilities are already over-burdened and reservations are needed in some of the campgrounds. An estimated 45,000 more campgrounds are needed throughout the State during this decade.

In order to accommodate the projected future demand for recreational facilities it will be necessary to consider such features as quality of environment, location of facilities in relation to urban areas, alternative levels of service, income levels, changes in consumer taste and preferences, and impacts upon other uses.

The ability of wilderness areas, primitive areas, natural areas, scenic areas, and open space as well as canals and aqueducts to satisfy the present and projected future demand will be determined. Potential

areas should be identified for possible inclusion in these categories. Methods of improving the present facilities and their access to better serve the public are also needed. The potential for privately owned recreation facilities to satisfy part of the demand needs to be determined.

Transportation and Utility Rights-of-Way

Approximately 85 percent of the right-of-way land in the Basin is used for highways, airports, aqueducts, and some utilities where the previous use or combination of uses has been permanently eliminated. Power lines, telephone lines, and pipelines only restrict or modify right-of-way use. Close multiple use planning is needed for future project locations with particular emphasis on projects with extensive rights-of-way to minimize erosion and loss of wildlife habitat.

General Economic

The Basin is experiencing the local benefits from the completion of two major public works -- the California Aqueduct and Interstate Highway 5. Although these projects are alleviating the water shortage and transportation problems, additional problems connected with regional growth are developing. There is a need to project how these public works will affect the complex process of regional growth of the whole system of farms, ranches, industry, recreation, residential and rural districts, and other related activities. Those factors which affect changes in the comparative economic advantages of various natural resource oriented industries need to be determined, especially the

dispersion of services. There is also a need to point out ways the people of the Basin can take advantage of its development opportunities and how USDA and other programs can help.

Agricultural Economics

Many of the agricultural economic problems of the Basin are related to a more intensive use of the land. By 1980 the California State and Federal San Luis Water Projects will serve more than one million irrigated acres of land in Stanislaus, Merced, Fresno, Kings, and Kern Counties. With the new development will come problems concerned with the individual farms -- input combinations, cropping patterns, land reclamation -- and the aggregate effect of the overall development on growers within the Basin, State, and Nation. Specific problems with varying degrees of severity will arise related to the distribution of water by water districts; relative high costs of water, crop adaptability to soils; and reclamation of land because of boron, salinity, alkalinity, and various subsurface characteristics. Other problems will be related to the growing of high-value crops which have greater yield variability, capital requirements, and more restrictive markets. There will likely be a crop price reaction in the future as new acreage comes into production and other production areas adjust.

Socio-Economic

One of the harsh realities is that many small, full-time family farms in the Basin have become uneconomic. Farmers are facing a cost-price squeeze and are going into debt due in part to investments

in expansion and modernization. Many farm workers are unhappy with low wages and poor working conditions. Some are organizing and striking. There is a need to develop programs or inputs into programs that will have a more equitable income redistribution effect to marginal growers, ease the transition of those going out of agriculture, and reduce the displacement of the farm and non-farm related labor force.

There are many farm laborers who have limited skills, training, and motivation. Many of these people are forced into a life style that prevents economic advancement. There is a need to develop inputs into programs that will break the cycle from outside with jobs and education, and training.

Environmental Quality

The Basin is faced with the problem of maintaining present quality of the environment as population and activity grow, and improving that quality where the need exists. A vast amount of the needed information on air and water pollution, land use and environment patterns is available. The consolidation and coordination of information is needed as it relates to problems such as solid waste disposal, agricultural drainage, mosquito vector control, wilderness areas, open space, fish and wildlife habitat, scenic rivers, and the production of goods and services. Projections of the effects on the environment caused by land use changes are needed.

Urban and Recreational Housing

Urbanization of agricultural land and the recreational development of agricultural and forested land have created many problems such as: the loss of prime agricultural land, acceleration of soil erosion, maintenance of water facilities, roads and sewage services, changes in the local tax base, and pollution and related problems. As of 1967, 526,000 acres of land had been converted to urban and recreational subdivisions in the basin. Projections to 1980 show this increasing to about 865,000 acres with 130,000 acres being prime agricultural land in Land Capability Classes I and II. There is a need to determine methods of developing subdivisions in an orderly fashion so as to benefit all of society, especially concerning developments on prime agricultural lands. There is also a need to determine what effects recreational developments will have on the services of local communities and what additional services will be needed. Of particular importance is solid waste disposal.

Objectives, Scope, and Expected Results

The objectives of the USDA San Joaquin Valley Basin Study are (1) to formulate alternative plans that solve problems, satisfy needs, and enhance one or more of the following: national economic development, the quality of environment, regional development;[1/] and (2) to assist local and regional decision makers select their Recommended Plan from the various alternative plans.

1/ There is a Water Resources Council suggestion pending that would require prior approval before the regional development objective could be considered.

The survey will be of sufficient scope to consider a range of solutions that will satisfy the stated problems and needs plus as many of the more specific problems and needs as possible that local decision makers will describe at public meetings in Los Banos, Fresno, and Bakersfield. These will be evaluated using the multi-objective evaluation procedure. Watersheds appearing to have problems appropriate for solution under PL 566 will be studied in sufficient depth to determine the approximate project benefits and costs and the impacts of the projects on the environment. The study report will be presented in the multiple-objective accounting system and will provide a general overall Basin appraisal of water, land, and plant resources and their potentials in an intensity and detail sufficient to serve as a guide for more detailed plans. Any apparent conflicts of resource management, development, and use will be pointed out. Close coordination with state and federal agencies and the public will be maintained to avoid duplication of effort.

The study began July 1, 1971, and is planned for completion in June 1977. The last year will be used to help decision makes select a Recommended Plan and begin implementation. River Basin funds are not authorized for use on implementation. Other funds, such as Conservation Operations, will be used for implementation. Projections will be made to 1980, 1990, and 2000. The base period will be the average of fiscal years 1970, 1971, and 1972 for existing conditions.

The study is expected to provide the following results:

1. Individual Watershed Investigations on potential PL 566 projects.
2. An overall report that presents Alternative Plans with supporting data and identifies early-action and long-term programs coordinated with State and other action agencies.
3. A final report that presents the Recommended Plan selected by the local decision makers and identifies early-action and long-term programs. It will be useable to begin implementation and to seek any needed legislation.
4. Basic resource information that can be used by planners and decision makers along with possible criteria for orderly development.
5. Information on water and related land resources useable as input data for the Western U.S. Water Plan Study.

Status of Water and Related Land Resource Programs

On-going programs in the basin include the following:

Federal Government

The Department of Agriculture

(1) The Soil Conservation Service has programs of on-farm assistance in the planning and application of conservation measures to landowners in 45 resource conservation districts in 10 counties. Three Small Watershed Protection and Flood Prevention Projects

are authorized for construction under PL 566, three are awaiting authorization for construction, and 11 are in various stages of planning. Detailed soil surveys are in progress for San Joaquin County, Kings County, Eastern Tulare County, Northwestern Kern County, and Southeastern Kern County. Published soil surveys cover eight million acres.

(2) Cost-sharing assistance to farmers and ranchers for application of practices designed to decrease the degradation of the land and water resources within the Basin is provided through the Rural Environmental Assistance Program (REAP) administered by the Agricultural Stabilization and Conservation Service.[1/]

(3) The Forest Service manages 3.4 million acres of land in the Stanislaus, Inyo, Sierra, Sequoia, and Los Padres National Forests. Reconnaissance soil surveys for all National Forest lands are scheduled for completion in 1974. Many cooperative programs with state, private, and corporation land holders are in progress.

(4) The Farmers Home Administration has funded Comprehensive County Water and Sewer Plans for all counties in the Basin covering communities with less than 5,500 population. It has participated in more than 38 projects involving water and/or waste disposal in these counties.

(5) The Agricultural Research Service is conducting numerous investigations in the Basin on agricultural drainage, irrigation, ground water recharge, and crop production. Several are being done in cooperation with the State Department of Water Resources.

[1/] As of December 22, 1972, REAP funding was terminated.

(6) The Economic Research Service is currently doing studies in the San Joaquin Valley related to capital-labor substitution, firm growth under uncertainty, and the secondary affects of pesticide and Nitrogen application.

The Department of the Interior

(1) The National Park Service manages over 1.6 million acres of land in the Yosemite, Kings Canyon, and Sequoia National Parks and the Devil's Postpile National Monument.

(2) The Bureau of Land Management manages 0.8 million acres of Public Domain.

(3) The Bureau of Reclamation operates the Friant-Kern and Delta-Mendota Canals which provide water to many of the 100 irrigation and water districts.

(4) The San Luis Canal reach of the California Aqueduct is administered jointly by the Bureau of Reclamation and the State of California.

(5) The Bureau of Reclamation is conducting the Western U.S. Water Plan Study.

(6) The Bureau of Reclamation provides water for the fall salmon run in the San Joaquin River when needed.

(7) The Bureau of Sports Fishery and Wildlife administers the San Luis, Merced, Pixley, Kesterson, and Kern National Wildlife Refuges.

The Department of Defense

The Corps of Engineers has participated in the construction of several flood control dams in the Basin. There are three under construction and 23 in the planning stage. As a part of this flood control effort, levees have been constructed along some reaches of the major rivers in the Basin.

The Department of Commerce

The Economic Development Administration has designated Fresno, Madera, Mariposa, Merced, San Joaquin, Stanislaus, Tulare, and Tuolumne Counties eligible to receive aid to encourage permanent employment.

The Department of Housing and Urban Development

Numerous funding programs for general planning by cities and counties are administered by the Department of Housing and Urban Development. Comprehensive General Plan studies are underway in San Joaquin and Tuolumne Counties.

State of California

The Department of Water Resources

(1) Programs are in force to develop the water supply facilities for agricultural, municipal, industrial, and other uses.

(2) Studies of water utilization and water quality are being conducted.

(3) Operates and maintains the California Aqueduct and serves water to contractors in Stanislaus, Kings, and Kern Counties.

(4) Provides physical barriers for the efficient use of Bureau of Reclamation water released for fall salmon runs on the San Joaquin River.

The Department of Fish and Game

(1) Fish hatcheries at Moccasin Creek, San Joaquin, Morehouse Springs, and Kern River are part of the trout stocking program on streams.

(2) Wildlife areas at Los Banos, Volta, and Mendota are part of the waterfowl management program.

(3) Game Management programs for big game and upland game are administered by the Department.

(4) Oversees salmon run restoration projects on the Merced and Tuolumne Rivers constructed by local agencies.

The Department of Health

Programs for vector control are underway in cooperation with individuals, state and federal agencies, and irrigation, drainage, reclamation, and mosquito abatement districts.

The Department of Parks and Recreation

The Department administers the Tule Elk State Reserve; Caswell Memorial State Park; the George J. Hatfield, Fremont Ford, San Luis Reservoir, Kern River, Millerton Lake, and Turlock Lake State Recreation Areas.

The Department of Conservation

(1) The Division of Forestry is responsible for prevention and suppression of fires occurring on state and private timber, watershed, range, and rural lands. Its land management programs include forest pest control, range improvement, and reforestation.

(2) The Division of Mines and Geology performs geological surveys and studies geologic hazards such as landslides and earthquakes.

(3) The Division of Oil and Gas supervises drilling, operation, maintenance, and abandonment of geothermal, oil, and gas wells.

State Boards

(1) The Central Valley Regional Water Quality Control Board is establishing water quality standards for the principal streams.

(2) The State Reclamation Board monitors the maintenance of stream channel flood control facilities to insure satisfactory functioning.

Local Governments

The Basin encompasses all of Fresno, Kings, Madera, Mariposa, Merced, Tulare, and Tuolumne Counties plus portions of Alameda, Alpine, Calaveras, Kern, San Benito, San Joaquin, San Luis Obispo, and Stanislaus Counties.

More than 100 irrigation and water districts supply water to the municipalities and agricultural lands in the Basin. Many of these districts have developed their own water supply sources and facilities, while others have only distribution facilities. There are forty-five Resource Conservation Districts in ten of the counties. More than 75 Reclamation Districts are organized in the Basin in addition to five Drainage Districts.

General Activity Chart and Schedule

An overview of the study is shown by the General Activity Chart and Schedule on page 24. There are four Planning Phases which follow in sequence and overlap in some cases to allow better scheduling:

I. Organize and Set Objectives
II. Inventory and Analysis of Resources
III. Planning and Evaluation of Alternatives
IV. Plan Development

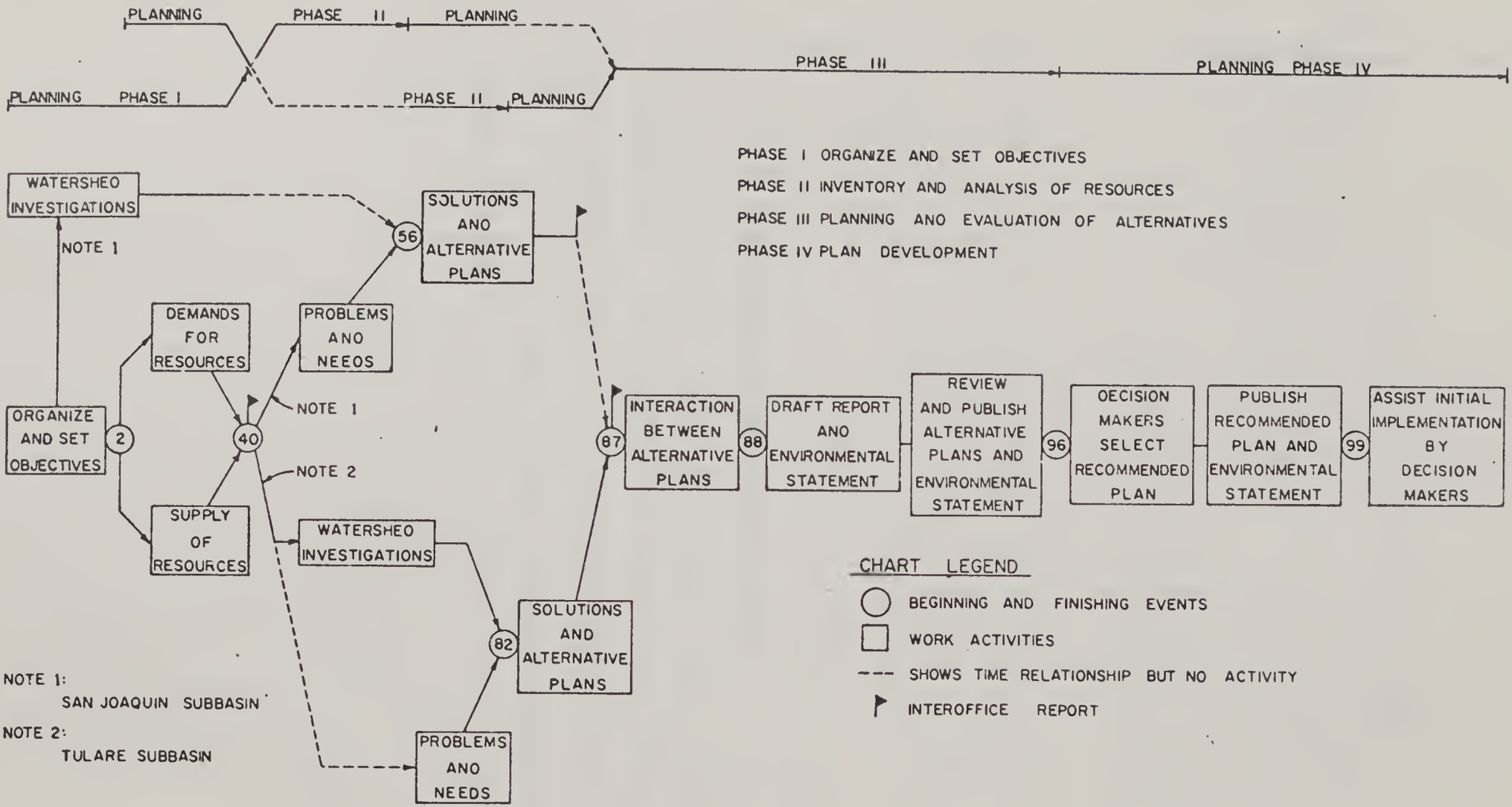
An inventory of the supply of resources and an analysis of the demands for resources will be made for the whole Basin. Then the problems and needs in the San Joaquin Subbasin will be studied before those in the Tulare Subbasin. The numbered events correspond to the detailed work outline in Appendix I.

Activities and General Procedures

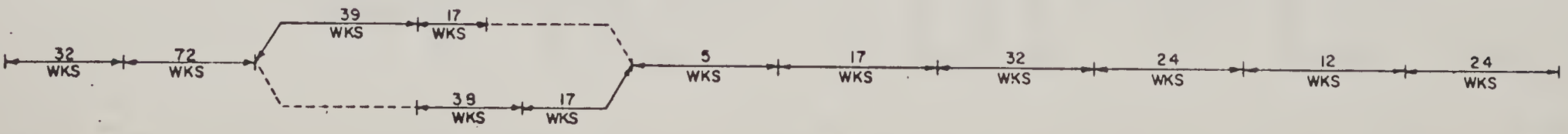
Each planning phase consists of several major activities. Each major activity has one or more detailed activities. Each detailed activity will be performed according to one or more general procedures. The activities and general procedures are shown on pages 25 through 47.

The overall responsibility of each USDA agency participating in the survey is shown next to each detailed activity. Joint responsibility is shown as (J). Primary responsibility is shown as (P). Secondary responsibility is shown as (S).

GENERAL ACTIVITY CHART AND SCHEDULE



FY 1972	FY 1973	FY 1974	FY 1975	FY 1976	FY 1977



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PLANNING PHASE I. ORGANIZE AND SET OBJECTIVES

MAJOR ACTIVITIES OF THE SURVEY	ACTIVITIES AND GENERAL PROCEDURES
A. Prepare the Plan of Work and Detailed Work Outline.	The USDA will develop programs for national forests, agricultural and upland watershed, and other lands. The Soil Conservation Service has primary study responsibility for agricultural and other non-forested lands; the Forest Service for federal, state, and private forest and brush covered lands; and the Economic Research Service for basinwide economic analyses. Existing studies and reports on the study area will be reviewed before field work commences. Coordination between the River Basin Staff and each national forest will be through the forest watershed staff officer or his appointed alternate. The assignment responsibility of each agency is indicated as primary (P), secondary (S), or joint (J): ERS (J) FS (J) SCS (J) A1 The reasons for conducting the study were examined and the objectives specified. The basis for the type and kind of resource inventories and the analyses to be made were established. The broad direction for writing a plan of work was determined. ERS (J) FS (J) SCS (J) A2 This plan of work was prepared using information in River Basin Memorandum SCS-12 and the August 1971 Draft of the Proposed Multi-Objective Guidelines in Planning and Evaluation of Water and Land Uses as a guide. Revisions will be made annually. ERS (J) FS (J) SCS (J) A3 Activities in the Plan of Work were charted using Program Evaluation and Review Technique (PERT). Inter-relationships and timing of activities were presented. Staffing requirements and cost estimates were developed for each activity. Work outlines for each agency have been incorporated. Revisions will be made annually.

MAJOR ACTIVITIES OF THE SURVEY			ACTIVITIES AND GENERAL PROCEDURES
	SCS (P)	A4	The Plan of Work and Detailed Work Outline will be incorporated into one document. Two hundred copies will be published. Copies will be sent to sponsoring and contributing agencies. Copies will also be sent to representatives of the Pacific Southwest Inter-Agency Committee, San Francisco Pilot Natural Resources Regional Council, California State-Federal Inter-Agency Task Force for Planning Coordination, California State-Federal Inter-Agency Work Group 4, and the (California) Citizens Environmental Advisory Committee.
B. Organize personnel and equipment.	ERS (J) FS (J) SCS (J)	B	Develop a staffing plan and make initial work assignments. Assemble aerial photos and other working maps and equipment.
C. Develop public information plan.	ERS (J) FS (J) SCS (J)	C1	Public meetings with resource conservation districts and other local decision makers were held in Los Banos, Fresno, and Bakersfield during 1972. They were jointly sponsored by the resource conservation districts, USDA, and DWR. The plan of work was presented, and local decision makers were asked to identify their local problems and nee Follow up meetings will be held during 1973 in these same localities. Similar meetings will be held during June 1974 and January 1975 to review the inventory phases. Additional meetings will be held during May and June 1976 to present the alternative plans. All agencies and local news media will be invited to these meetings. However, for minor impromptu meetings, the agency involved will inform the other agencies of the proceedings.
	SCS (P)	C2	A public relations committee will be organized with representation from SCS, FS, ERS, and chaired by DWR. News releases, slide talks, speakers bureau, a a one-page, folded brochure will be utilized for public meetings.

PLANNING PHASE II. INVENTORY AND ANALYSIS OF RESOURCES: A. DETERMINE THE PRESENT AND FUTURE DEMAND FOR AND SUPPLY OF NATURAL RESOURCES

MAJOR ACTIVITIES OF THE SURVEY		ACTIVITIES AND GENERAL PROCEDURES	
		The following Procedures will be completed for the entire Basin.	
A1	Inventory the soil resources.	FS (S) SCS (P)	A1 Published soil surveys, county general soil maps, Pacific Southwest Phase I data, and the generalized soils map in the Map Information and Display System (MIADS) will be used to prepare a General Soil Map for each subbasin at 1:250,000 scale. The extent of each mapping unit will be tabulated and the estimated percent of major constituent soils will be shown.
A2	Develop a land classification system that will relate soil survey data into a uniform system of soil resource groups and watershed planning units. The groupings will permit a reasonable degree of accuracy in estimating and projecting yields.	SCS (P)	A2a Soil Resource Group criteria developed during the California Region Comprehensive Framework Study will be coordinated with criteria developed for the Western U.S. Water Plan Study. The final criteria will be approved by the SCS State Soil Scientist.
		SCS (P)	A2b The major constituent soils in each mapping unit on the General Soil Map will be rated into a Soil Resource Group. Tabulations of acreage of each SRG will be made for each subbasin.
		FS (P)	A2c A system of watershed planning units (WPU) will be developed. The WPU's will be based on the Project Work Inventory system of watershed delineation developed by the Forest Service. Vegetation type, site index, slope, aspect and any other parameter that can help determine the best management practices will be inventoried in each WPU.

MAJOR ACTIVITIES OF THE SURVEY		ACTIVITIES AND GENERAL PROCEDURES
A3 Collect and tabulate data on acreages, yields, production costs, and prices of important agricultural, forestry, and recreation commodities; and income, employment, and income distribution of the people in the Basin.	ERS (P) FS (S) SCS (S)	A3 Acreages, yields, production costs, and prices of major agricultural, forestry, and recreational commodities; and income, employment and income distribution of the people of the Basin will be collected from secondary sources of: California Crop and Livestock Reporting Service, California Type I Comprehensive Framework Study, California Statistical Abstract, California Department of Water Resources bulletins, Agricultural Commissioners' reports, and the Human Resources Agency statistics. Production cost data will be tabulated by variable and fixed cost, harvest and non-harvest cost, total investment and water, labor, fertilizer and management cost will be separated. Data will be collected for two levels of management. Tabulations by county, subbasin, WPU, and soil resource group (SRG) will be made.
A4 Inventory present irrigation water, labor, and capital use and supplies, vegetative cover, other natural resources and land ownerships; and land uses for urban, agriculture, timber, grazing, recreation, wildlife and other uses.	SCS (P)	A4a Published reports by irrigation districts and water delivery agencies will be used to determine irrigation water use. Water use on lands outside of districts will be estimated from land use data and consumptive use and leaching requirements. Tabulations by subbasins will be made.
	SCS (P)	A4b Data from the Comprehensive Framework Study will be updated by recent agency reports to determine the present supply of irrigation water. Tabulations by subbasin will be made.
	FS (P)	A4c Soils, vegetative cover, and other natural resource data will be developed for the forested land and mapped and tabulated by WPU's. These data will be collected from published reports and supplemental field work.

MAJOR ACTIVITIES OF THE SURVEY			ACTIVITIES AND GENERAL PROCEDURES
	FS (J) SCS (J)	A4d	Land Ownership, vegetal cover types, and land use survey data from the California Department of Water Resources, the MIADS computer program, and governmental agencies will be used to determine the extent of present ownership and uses. Tabulations and a 1:250,000 scale land ownership map and land use map will be prepared for each subbasin.
	ERS (P)	A4e	Labor and capital use and supply will be determined from University of California, Extension Service Budgets and from University Extension personnel and field people. Production cost will be subtracted from total returns (price x quantity) to determine net returns for commodities. Tabulations will be made by SRG's, WPU's, and subbasins.
A5 Determine the present and future share of the National and State market demands for products and services originating in the Basin.	ERS (P)	A5	Present and future demands for production will first be determined by using projected shares of the market (OBERS, other Type I projections, and recent trends); and then functional relationships will be developed using regression analysis considering prices and quantities of commodities in the study area, production in the rest of the United States, imports and exports, and disposable income. Some field work may be needed to check the accuracy of using secondary county data. See Appendix II.
A6 Develop a analytical system to determine the present and future demand for natural resources.	ERS (P)	A6	A linear programming model will be developed with the following components: Basin, subbasin, SRG, WPU, watershed areas, resource restraints, production relationships, production cost and returns, and market restraints at alternative prices; accumulation accounts

MAJOR ACTIVITIES OF THE SURVEY		ACTIVITIES AND GENERAL PROCEDURES
		A6 cont. which allow for the production of effluents and resources (such as water), and the employment and income of labor; accounts which allow for the setting of restraints related to environmental quality and regional development; and accounts which allow for the varying of prices and quantities of resources in order to derive a demand function for resources considering national economic development (NED, regional development (RD), and environmental quality (EQ). See Appendix II.
A7 Develop an analytical system to determine the present and future supply of natural resources.	ERS (P) FS (S) SCS (S)	A7 A model to determine resource supply will be developed which considers suitability and availability of resource, resource cost, land conversion cost, institutional restraints, and alternative programs and levels of programs. This model will show what quantities of resources could be made available at alternative levels of cost considering NED, RD, EQ. See Appendix II.
A8 Develop primary and secondary resource production relationships for the land classification system relating resource inputs to product outputs.	ERS (J) FS (J) SCS (J)	A8 Resource production relationships will be developed relating water, land, labor, and capital to yields of products, including sediment, solid and liquid wastes, water quality and quantity. ERS will supply much of the secondary data and trends of these data, which will be used by SCS and FS as a base for specific SRG's, watersheds, and WPU's. The basic data will be collected from file records and published reports, and related to the WPU system of land units. These data will be supplemented and strengthened by field examination.
A9 Determine the suitability of soil associations and watershed planning units for various land resource uses.	FS (S) SCS (P)	A9a Interpretative criteria developed by the Water Resources Council in July 1967 and March 1968 for determining Irrigable Land Classes, criteria attached to SCS Soils Memorandum Cal-32, and other criteria approved by the State Soil Scientist will be used to interpret the General Soil Map data. Soil interpretation maps for each subbasin will be prepared at a

MAJOR ACTIVITIES OF THE SURVEY		ACTIVITIES AND GENERAL PROCEDURES
		A9a cont. 1:250,000 scale. The MIADS computer program will be used for acreage tabulations on each map. The following maps will be prepared: Irrigation Soil Classes Range Sites Timber Suitability Classes
	FS (P)	A9b The suitability of the soils in each WPU to produce timber, water, wildlife, and recreational experience will be determined. Most of these data will be obtained from existing records from various state and federal agencies, and coordinated with Forest Service multiple use management plans where applicable.
A10 Determine the availability of soil associations and watershed planning units having favorable suitabilities for various land resource uses.	FS (S) SCS (P)	A10a Land Ownership and Land Use Maps will be compared to the Soil Interpretation Maps to determine the relative availability of land resources for future development. MIADS computer programs will be prepared to perform these comparisons and provide acreage tabulations. The following availability maps will be prepared for each subbasin at a scale of 1:250,000: Availability for Irrigation Development Availability for Timber Improvement Availability for Range Improvement.
	FS (P)	A10b With the help of land ownership and land classification records on the National Forests, the availability of WPU's for various land resource uses will be determined.
A11 Determine the present and future supply of natural resources considering alternative uses, management, and development considering national economic development, regional development, and environmental quality	ERS (J) FS (J) SCS (J)	A11 The present and future supply of natural resources will be determined using the information of A7, A9, and A10a. A stepped relationship between the cost and quantity of resources in alternative uses will be derived. See Appendix II.

MAJOR ACTIVITIES OF THE SURVEY		ACTIVITIES AND GENERAL PROCEDURES
A12 Determine the present and future demand for natural resource considering alternative levels of demand for products and services, and resource production relationships considering national economic development, regional development, and environmental quality.	ERS (J) FS (J) SCS (J)	A12 The present and future demand for natural resources will be determined using the linear programming model of A6 and data developed in A5 and A8. The model will evaluate the interaction of agriculture, recreation, and forestry with the resource base of the Basin. The demand for resources will be derived considering the supply and allocation of resources to alternative uses in order to maximize the net social benefits to society under the alternatives of NED, RD, and EQ. A "stepped" relationship between the quantity and value of resources in alternative uses will be derived. See Appendix II.

PLANNING PHASE II. INVENTORY AND ANALYSIS OF RESOURCES: B. DETERMINE THE PRESENT AND PREDICT FUTURE NATURAL RESOURCE PROBLEMS AND NEEDS ASSUMING (1) NO ADDITIONAL RESOURCE DEVELOPMENT, (2) CURRENT RATE OF PROGRAM APPLICATION, AND (3) PROJECTED FUTURE DEVELOPMENT CONSIDERING NATIONAL ECONOMIC DEVELOPMENT, REGIONAL DEVELOPMENT, AND ENVIRONMENTAL QUALITY.

MAJOR ACTIVITIES OF THE SURVEY		ACTIVITIES AND GENERAL PROCEDURES
		All of the following will be completed first for the San Joaquin Subbasin and then for the Tulare Subbasin.
B1 Determine production needs to be produced by each subbasin and by the Basin.	ERS (P) FS (S) SCS (S)	B1 Production needs will be determined by the share of the market and functional relationships developed in A5 above and combining the results of A11 and A12 above. These needs will be projected to 1980, 1990, and 2000. See Appendix II.
B2 Determine the need for and problems of reallocating the existing resources to solve current and projected production needs.	ERS (P) FS (S) SCS (S)	B2 The linear programming model will be run using the existing resource base to meet current and future production needs. This will give the basis for the "without" project condition. Needs for resource development (based not only on quantity but also on value) will be derived by Basin, subbasin, SRG, WPU, and national forest. See Appendix II.

MAJOR ACTIVITIES OF THE STUDY		ACTIVITIES AND GENERAL PROCEDURES
B3 Inventory the extent of existing problems and needs and predict future problems and needs of agricultural drainage, agricultural irrigation, flooding, wildfires, erosion, sedimentation, economic development, fish and wildlife habitat, timber management, grazing management, recreation development, transportation and utility rights-of-way management, urbanization, municipal and industrial water supply, green open space, scenic rivers, wilderness areas, solid waste disposal, air quality, and effects caused by land use changes.	ERS (S) SCS (P)	B3a The extent of present and future high water table and toxic salt problems will be based on field inspections, California Department of Water Resources reports, University of California and Bureau of Reclamation reports, projections of demand for irrigated cropland and pasture land, and knowledge of local personnel. Drain outlet conditions will be checked to determine the method and place of disposal. Estimates of the quantity and quality of effluent will be made. Resource availability maps will be compared to soil suitability maps. Tabulations will be prepared for drainage problem areas and summarized for each subbasin. Watershed investigations (WI) will be made on problem areas that meet the general criteria for PL 566 projects. A 1:250,000 scale map will be prepared for each subbasin.
	ERS (S) SCS (P)	B3b The extent of present and future agricultural irrigation problems will be based on field inspections, published reports, projections of demand for irrigated cropland and pasture land, and local knowledge. Water delivery schedules, peak water demands, water quality, and irrigation efficiency will be checked. Watershed Investigations (WI) will be made on problem areas that meet the general criteria for PL 566 projects. The resource availability maps will be compared to the soil suitability maps. Areas projected for new irrigation development will be delineated. A generalized irrigation guide will be adapted from Land Resource Area Irrigation Guides for these new areas. Tabulations and maps at 1:250,000 scale will be prepared for each subbasin.

MAJOR ACTIVITIES OF THE SURVEY	ACTIVITIES AND GENERAL PROCEDURES	
	FS (S) SCS (P)	B3c The extent of flooding problems will be based on field inspections, the 1969 Report on the Watershed Phase of the Conservation Needs Inventory, published reports, and local knowledge. Work will proceed from the westside to the eastside of the San Joaquin Subbasin and then from the westside to the eastside of the Tulare Subbasin. Watershed Investigations (WI) will be made on problem areas in watersheds of 250,000 acres or less that meet the general criteria for PL 566 projects. A 1:250,000 scale map will be prepared for each subbasin.
	FS (S) SCS (P)	B3d The extent of present erosion and sedimentation problems on agricultural non-forested lands will be based on field inspections, published and unpublished soil surveys, agency reports and knowledge of local SCS personnel. Quantitative investigations will be made to determine the erosion rate on moderately and severely eroding rangeland. The extent of future erosion and sedimentation problems will be based on projections for development of irrigated cropland, pasture land, highways, utilities, and residential development. The General Soil Map will be interpreted for erosion hazard using the MIADS computer program. Erosion rates will be estimated for each named soil in each soil association on the General Soil Map. Quantitative tabulations will be prepared for each subbasin. These areas will be shown on the 1:250,000 scale map developed in B3c above.

MAJOR ACTIVITIES OF THE SURVEY	ACTIVITIES AND GENERAL PROCEDURES
	FS (P) B3e The specific techniques of evaluating environmental and economic impact of problems will be tailored and adapted to specific needs. However, certain basic tools, such as aerial photographs and fifteen minute topographic quad maps, will be used. A modified Musgrave erosion equation will be used to determine erosion which will then be correlated with U.S. Geological Survey suspended sedimentation data to estimate sedimentation. Present and future erosion and sediment production will not be determined on all forest land as it was in past Type IV studies in California. Available suspended sediment data will be used to estimate total sediment produced from the watersheds and river basins. Relative amounts produced from given activities can then be determined by combining on the ground observations with the estimated total sediment production. Erosion rates will be estimated for each WPU. Primary data on timber, recreation, wildlife, water and grazing resources, and the other management activities mentioned will be obtained from available published and unpublished documents and records. Where needed, field work will supplement the data. The National Forest Service and National Park Service administration staffs will be contacted when data within their respective jurisdictions are needed. The applicable state administration will be contacted for data needed on state and private lands. Where no data are available, reasoned approximations will be used.

MAJOR ACTIVITIES OF THE SURVEY		ACTIVITIES AND GENERAL PROCEDURES
	ERS (J) FS (J) SCS (J)	B3f Urban and recreational housing growth will be studied to determine what demands will be placed on the resource base in the future. Projections of lands going out of agriculture and forestry into the above use will be made by subbasin, SRG, and WPU. Projections of related services (such as water, sewage, and roads) will be made. Published reports such as the California Conservation Needs Inventory, local and state planning agencies, and University of California studies will be used
	ERS (J) FS (J) SCS (J)	B3g Municipal and industrial (M&I) water supply problems will be studied to relate these demands to the total water supply. A shift from ground water development to surface water supplies is expected in order to satisfy future demand. The Basin does not have assured M&I water supplies beyond 1980. Published reports and knowledge of local water companies will be used. Projections will be developed for each subbasin.
	ERS (P)	B3h The related economic activities associated with agricultural, recreation and forestry growth will be specified by subbasin and basin. Various input-output models have been developed (Type I, University of California, Army Corps of Engineers) for California and will be relied upon to supply information on employment, income, water, and associated activities as they relate to changes in gross regional product.

MAJOR ACTIVITIES OF THE SURVEY	ACTIVITIES AND GENERAL PROCEDURES	
	ERS (J) FS (J) SCS (J)	B3i The extent of grazing management improvements will be based on the projected demand for livestock and the availability of rangeland. The potential for increasing forage yields will be determined. The need for additional livestock water facilities will be checked. Tabulations will be prepared for each subbasin and WPU.
	ERS (S) SCS (P)	B3j The extent of needed improvements in habitat for waterfowl on private and public areas will be based on projections for hunter demand and the availability of suitable sites. Maps at 1:250,000 scale and tabulations will be prepared for each subbasin.
	ERS (S) FS (P)	B3k The extent of needed improvements in the habitat of upland game will be based on available data from federal and state agencies. The demand for game, in the future, will be based on projections of hunter demand and the availability of suitable habitat. Data will be tabulated and prepared for each subbasin and WPU.

MAJOR ACTIVITIES OF THE SURVEY	ACTIVITIES AND GENERAL PROCEDURES		
	ERS (S) FS (P)	B3m	The extent of present and future problems and needs in habitat for warm and cold water fish produced in public waters will be based on projections for future demands for catchable fish. The availability of waters of suitable quantity and quality will be determined. Data will be tabulated and prepared for each subbasin and WPU.
	ERS (S) FS (P)	B3n	The extent of present and future problems and needs in the spawning areas for anadronomous fish will be based on available data from federal and state agencies. The demand for these fish will be based on commercial and private needs balanced with tbe physical limitations of spawning areas. Data will be tabulated and prepared for each subbasin and WPU.
	FS (P)	B3o	Present and future problems and needs of areas burned by wildfire will be based on available data from the California Division of Forestry and the Forest Service Division of Fire Control and supplemented by field data. The areas of needed reforestation and erosion control will be determined. Data will be tabulated and prepared by subbasins, SRG's, and WPU's.
	FS (P)	B3p	Present and future problems of timber management on both the public and private lands will be based on records of the U.S. Forest Service and California Division of Forestry and supplemented by field data. Future timber needs will be based on the projected population and per capita use of wood products. The environmental damage of producing the required volume of wood will be measured or estimated. Available methods of reducing this damage will be considered and new methods will be developed where present methods are lacking. Road construction will

MAJOR ACTIVITIES OF THE SURVEY		ACTIVITIES AND GENERAL PROCEDURES
	B3p cont.	be investigated to determine where and how present and future roads can be improved in order to reduce their adverse environmental impact. Reforestation needs will be studied, and the erosional aspects of all timber management programs will be studied using the techniques outlined in B3e above. All data will be tabulated and processed by subbasin, SRG, and WPU.
	FS (P) B3q	Present and future needs and problems regarding possible wild and scenic classification of rivers will be studied using available records and field examination. Data will be prepared for each subbasin and WPU.
	FS (P) B3r	The study of the present and future problems and needs of wilderness areas will be based on available records supplemented with field study. Data will be tabulated and prepared by subbasin and WPU.
	FS (J) SCS (J) B3s	The extent of the present and future problems and needs associated with solid waste disposal will be studied. Data will be collected on feedlot, sawmill, and other industry and municipal, and campground solid waste problems from available records. The capacity of existing sanitary landfill sites to satisfy future demand will be determined. Potential landfill sites will be identified. Data will be tabulated and prepared by subbasin and WPU.

MAJOR ACTIVITIES OF THE SURVEY	ACTIVITIES AND GENERAL PROCEDURES	
	ERS (J) FS (J) SCS (J)	B3t The study of present and future problems and needs of recreation will be based on available records. Projections will be based on population trends and growth estimations. An inventory of potential recreation trail systems, potential recreation sites for off road vehicles, potential public and private camp sites, and the potential for shooting preserve development will be made. Opportunities for vacation farms will be determined. Data will be tabulated by subbasin, SRG, and WPU.
	FS (J) SCS (J)	B3u The present and future problems and needs associated with right-of-way development and location will be studied using available records and field observations. Erosion and hydrologic damage will be studied. The effect of rights-of-way on other resources and their use will be studied. Data tabulations will be made by subbasin and WPU.
	FS (S) SCS (P)	B3v Present and future problems and needs associated with open space will be studied using presently available records. Projections will be made using demographic information as a base. An inventory of waterways will be made to see how they can integrate open space and recreational facilities with settlement patterns. Potential parkways and scenic highways will be identified. Data will be tabulated for each subbasin and WPU.

MAJOR ACTIVITIES OF THE SURVEY		ACTIVITIES AND GENERAL PROCEDURES
	FS (P) SCS (S)	B3w The extent of present and future problems and needs of air quality will be studied using available records supplemented by field observations. Areas where sawmill smoke and where dust problems are prevalent will be identified and recorded. Areas that could develop auto exhaust pollution problems will also be identified. Roadside areas where the vegetation shows signs of auto pollution kill will be identified and recorded. All data will be tabulated and prepared by subbasin and WPU.
	FS (J) SCS (J)	B3x The present and future problem and needs of water quality and quantity will be studied using available records. Sources of all types of pollution will be identified and possible means of control will be presented. Data tabulations snd preparation will be by subbasin and WPU.
B4 Determine the need for and problems of reallocating the existing resources to solve additional problems and needs developed in B3 above.	ERS (J) FS (J) SCS (J)	B4 The linear programming model will be run incorporating the information generated by SCS and FS with respect to the specific problems and needs they are analyzing. The objective function, resource and market restraints, and production relationships will be varied to reflect changes in needs and to analyze what additional problems may develop. These will be related to the results from B2 above. See Appendix II.

PLANNING PHASE III. PLANNING AND EVALUATION OF ALTERNATIVES: A. DESIGN A RANGE OF SOLUTIONS TO SATISFY NEEDS AND TO SOLVE PROBLEMS AND FORMULATE ALTERNATIVE PLANS AND EVALUATE THEM USING THE MULTI-OBJECTIVE EVALUATION PROCEDURE.

MAJOR ACTIVITIES OF THE SURVEY .		ACTIVITIES AND GENERAL PROCEDURES
A1 Design a range of solutions that will satisfy needs and solve problems.	ERS (J) FS (J) $CS (J)	A1a Solutions ranging from no action to complete solution will be developed for each major problem and need and presented by the following land types: irrigated cropland, irrigated pastureland, non-irrigated cropland and pastureland, rangeland, recreation land, residential land, commercial and industrial land, community services land, transportation services land, wildlife land, forested and brush covered lands. These are not mutually exclusive uses. The cost of each solution will be shown.
	ERS (J) FS (J) SCS (J)	A1b Each soltuion will be identified as Early Action or Long Term. Early Action will apply to actions that can be completed by 1990. Long Term will apply to actions that will be completed after 1990 and before 2020.
A2 Evaluate each solution using the multi-objective evaluation procedure.	ERS (J) FS (J) SCS (J)	A2 The impact of each solution, both favorable and adverse, upon national economic development will be presented by describing the (1) value of users of changes in output of goods and services; (2) value of output resulting from external economies and diseconomies; and (3) changes in value of output resulting from the use of resources unemployed or under employed. Impacts on environmental quality will describe the changes in (1) visual quality: Those physical environmental components or combinations of components capable of being observed by the human eye; (2) biologic land, air, and water quality: Change in the physical, chemical, and biological qualities of land, air, and water brought about by man or man-related activities; and (3) human use and interest: Measures of the use of the environment by man and of human interest qualities stimulated by the intellect and emotions of man.

MAJOR ACTIVITIES OF THE SURVEY		ACTIVITIES AND GENERAL PROCEDURES
		A2 cont. Impacts on regional development will describe the (1) value of changes in outputs of goods and services to users residing in each subbasin; (2) value of output in each subbasin resulting from external economies and diseconomies caused by the solution; (3) changes in value of output in each subbasin resulting from the use of resources and otherwise unemployed or under employed; (4) increased number and/or type of job over and above under employment and unemployment; and (5) changes in economic stability in each subbasin. Impacts on quality of life will describe effects on the labor force, incomes, population dispersal and urban-rural balance. The August 1971 Draft of the Proposed Multi-Objective Guidelines for Planning and Evaluation of Water and Land Uses will be used as a guide pending results from public hearings.
A3 Formulate and evaluate alternative plans using the multi-objective evaluation procedure.	ERS (J) FS (J) SCS (J)	A3a Alternative plans for each subbasin will be formulated from the solutions. At least one alternative will emphasize national economic development; another will emphasize environmental quality; another will emphasize regional development. An evaluation of each alternative plan will be presented using the multi-objective evaluation proced Each alternative plan will be presented by the following land types: irrigated cropland, irrigated pastureland, non-irrigated cropland and pastureland, rangeland, recreation land, residential land, commercial/ industrial land, community services land, transportation services land, wildlife land, forested and brush covered lands. Both Early Action and Long Term actions will be identified.
	FS (P)	A3b All plans affecting the National Forests will be checked with multiple use plans to insure compatibility. Conflicts must be resolved before the plan is finalized.

MAJOR ACTIVITIES OF THE SURVEY	ACTIVITIES AND GENERAL PROCEDURES
	ERS (J) FS (J) SCS (J) A3c The interaction between the alternative plans for the San Joaquin and those for the Tulare Subbasins will be resolved and incorporated into alternative plans for the whole Basin.

PLANNING PHASE III. PLANNING AND EVALUATION: B. DETERMINE WHAT IMPROVEMENTS CAN BE MADE THROUGH APPLICATION OF PROGRAMS AVAILABLE UNDER EXISTING USDA AND OTHER AUTHORITIES, AND WHAT ADDITIONAL AUTHORITIES ARE NEEDED TO COMPLETE EACH ALTERNATIVE PLAN.

MAJOR ACTIVITIES OF THE SURVEY	ACTIVITIES AND GENERAL PROCEDURES
	The following procedures will be completed for the entire Basin.
B1 Identify portions of each alternative plan that can be accomplished at the current rate of application of programs available under present USDA and other authorities.	ERS (J) FS (J) SCS (J) B1 Actions in each alternative plan that can be accomplished by the PL 46 Conservation Operations Program, PL 566 Small Watershed Protection and Flood Prevention Projects, Resource Conservation Development Projects, Farmers Home Administration Loans, National Forest programs, cooperative forest management programs, and by other programs will be identified. The estimated portion of each alternative plan that can be accomplished by the application of these existing USDA programs and other programs at the current rate will be shown. The current rate of application will be the average of fiscal years 1970, 1971, and 1972.

MAJOR ACTIVITIES OF THE SURVEY		ACTIVITIES AND GENERAL PROCEDURES
B2 Identify portions of each alternative plan that can be accomplished at an accelerated rate of application of programs available under present USDA and other authorities.	ERS (J) FS (J) SCS (J)	B2 The Early Action items in each alternative plan identified in B1 above that can be accomplished by the application of existing USDA programs and other programs at an accelerated rate will be shown. The accelerated rate of application assumes full funding for these programs.
B3 Identify new legislative authorities needed to complete the remaining portion of each alternative plan.	ERS (J) FS (J) SCS (J)	B3 New authorities needed will be identified for those portions of each alternative plan that lack authority, including authorities for cost-sharing loans, and technical assistance. Recommendations from the Farmers Home Administration, ASCS, FS, and from personnel working on PL 566 and RC&D projects will be obtained. New authorities applicable to USDA will be identified.
B4 Evaluate the impacts of not completing that portion of each alternative plan which requires new authorities.	ERS (J) FS (J) SCS (J)	B4 The impacts of not completing that portion of each alternative plan which lacks authority will be evaluated and presented using the multi-objective evaluation procedure.

PLANNING PHASE III. PLANNING AND EVALUATION: C. PREPARE AN OVERALL REPORT

MAJOR ACTIVITIES OF THE SURVEY		ACTIVITIES AND GENERAL PROCEDURES
C Prepare, review, and publish the alternative plans and an environmental statement.	ERS (J) FS (J) SCS (J)	C1 An overall report will be drafted to include the present and future demand for and supply of natural resources, the problems and needs, the alternative plans, and a description of additional authorities that USDA and other agencies need.
	ERS (J) FS (J) SCS (J)	C2 An environmental statement will be drafted for compliance with Section 102(2)(c) of the National Environmental Policy Act of 1969 (PL 91-190). Environment Memorandum SCS-1 and SCS-6 will be followed as well as SCS Environmental Memorandum Cal-3 and any future publications. The environmental statement for the forest lands will be drafted by the Forest Service.

MAJOR ACTIVITIES OF THE SURVEY	ACTIVITIES AND GENERAL PROCEDURES		
	SCS (P)	C3	The draft report on the Alternative Plans and the environmental statement will be published in one document. Fifty copies will be made. The draft report will be submitted to contributing and sponsoring agencies for technical review. Copies will also be sent to representatives of the Pacific Southwest Inter-Agency Committee, the San Francisco Pilot Natural Resources Regional Council, U.S. Water Resources Council, U.S. Office of Management and Budget, California State-Federal Inter-Agency Task Force for Planning Coordination, California State-Federal Inter-Agency Work Group 4, and the (California) Citizens Environmental Advisory Committee.
	ERS (J) FS (J) SCS (J)	C4	The draft report will be revised using the review comments. Two hundred copies of the report will be published.

PLANNING PHASE IV. PLAN DEVELOPMENT

MAJOR ACTIVITIES OF THE SURVEY	ACTIVITIES AND GENERAL PROCEDURES		
A Decision Makers review Alternative Plans and select Recommended Plan.	ERS (J) FS (J) SCS (J)	A1	The Alternative Plans will be presented to decision makers at public meetings and study sessions. Presentations will be made to County Boards of Supervisors, County Planning Agencies, City Councils, Resource Conservation Districts, Irrigation Districts, Financial and educational institutions, conservation groups, state and federal agencies.

MAJOR ACTIVITIES OF THE SURVEY			ACTIVITIES AND GENERAL PROCEDURES
	ERS (J) FS (J) SCS (J)	A2	Decision makers will be assisted in the selection of a Recommended Plan and will be provided technical consultation when requested for study sessions and group meetings. Repeat visits to groups will be made until there is a general consensus on one Recommended Plan.
	ERS (J) FS (J) SCS (J)	A3	The Recommended Plan and Environmental Statement will be published in one document. An evaluation of the Recommended Plan will be presented using the multi-objective evaluation procedure. Both Early Action and Long Term actions will be identified. The Alternative Plans not adopted will be presented with comments why they were not used. Five hundred copies will be made.
B Initial implementation of Recommended Plan.	ERS (J) FS (J) SCS (J)	B	The Recommended Plan will be presented to the same decision makers contacted in A1 above. Presentations will also be made to civic groups and others as requested. Each group will be assisted and urged to begin implementing the Plan.
C Public Information Program to inform all publics.	SCS (P)	C	A concentrated public relations program first on the alternative plans and then on the Recommended Plan will be coordinated by the public relations committee.

ARRANGEMENTS FOR COORDINATION

Coordination of the study between the cooperating agencies and the public will be the responsibility of the USDA Field Advisory Committee. The principal cooperating agency, outside USDA, is the California Department of Water Resources but many other agencies will be involved in various phases of the study.

The Field Advisory Committee will make arrangements for the free exchange of information between all cooperating agencies. Meetings will be held, when appropriate, to inform agencies outside USDA of progress of the study. The Task Force For Planning Coordination and Work Group No. 4 of the State-Federal Inter-Agency Group will be utilized as coordinating groups. The Department of Water Resources will coordinate with other state agencies on input to the study.

The Field Advisory Committee, in cooperating with the California Department of Water Resources, will arrange and conduct public meetings to inform the public about the study and to receive public testimony. Generally, contact with the public will be maintained through public agencies and private organizations.

ADMINISTRATION OF THE SURVEY

Overall guidance and coordination of the study will be the responsibility of the Field Advisory Committee (FAC). Members are:

G. H. Stone, SCS, Chairman

James E. Reid

Ray S. Lanier, ERS

Coordination among the three participating USDA agencies -- Soil Conservation Service, Forest Service, and Economic Research Service -- will be carried out in accordance with the Memorandum of Understanding dated May 6, 1968.

The Field Advisory Committee will hold regular meetings quarterly and special meetings when needed as called by the chairman.

FUNDING ESTIMATES

	FY 72	FY 73	FY 74	FY 75	FY 76	FY 77
SCS	109,200 3/	150,400	149,300	146,000	92,200	86,100
FS 1/	17,000 3/	39,800	39,800	39,800	15,300	8,000
ERS 2/	36,000 3/	42,200	44,200	44,800	25,300	13,900
Total	162,200	232,400	233,300	230,600	132,800	108,000

TOTAL STUDY COST 1,099,300

1/ Includes 10% for Washington Office

2/ Includes 21% for Washington Office and 7% for Field Advisory Committee and Management

3/ Actual funding for FY 72

STAFFING

The planning staff will be headquartered in Berkeley under the coordination of Darwyn H. Briggs, Head, USDA River Basin Planning Staff.

Soil Conservation Service

Agricultural Economist	Mark W. Sussman
Civil Engineer	Romeo A. Rivera
Civil Engineer	Bernard J. Hewes
Civil Engineer	Gylan L. Dickey
Clerk-Stenographer	Janet D. Hiatt
Physical Science Aid	Thomas P. Parker
Physical Science Aid	Wm. Steven Day
Soil Conservationist	Walter A. Bunter, Jr.
Soil Conservationist	Jay W. Grier

The agronomist for Areas 3 and 4, area conservationists for Areas 3 and 4, civil engineer, district conservationists for Areas 3 and 4, engineering draftsman, public information officer, state conservation agronomist, state biologist, state conservation engineer, state geologist, state range conservationist, state resource conservationist, state soil scientist, and state woodland conservationist will also participate.

Forest Service

Branch Chief	Lyle M. Klubben
Forest Economist	James D. Cook
Forester	Vacant
Hydrologist	Vacant
Soils Hydrologist	Darwin B. Crezee

Watershed staff officers for the Inyo, Los Padres, Sierra, Sequoia, and Stanislaus National Forests will also participate.

Economic Research Service

Agricultural Economist	Robert B. McKusick
Agricultural Economist	Clifford Dickason
Secretary-Stenographer	Beatrice C. Morgenegg
Secretary-Stenographer	Marge I. Pearse
Statistical Clerk	Mike Nakagawa
Computer Programmer	Mary K. Skrable

PROGRESS REPORTS

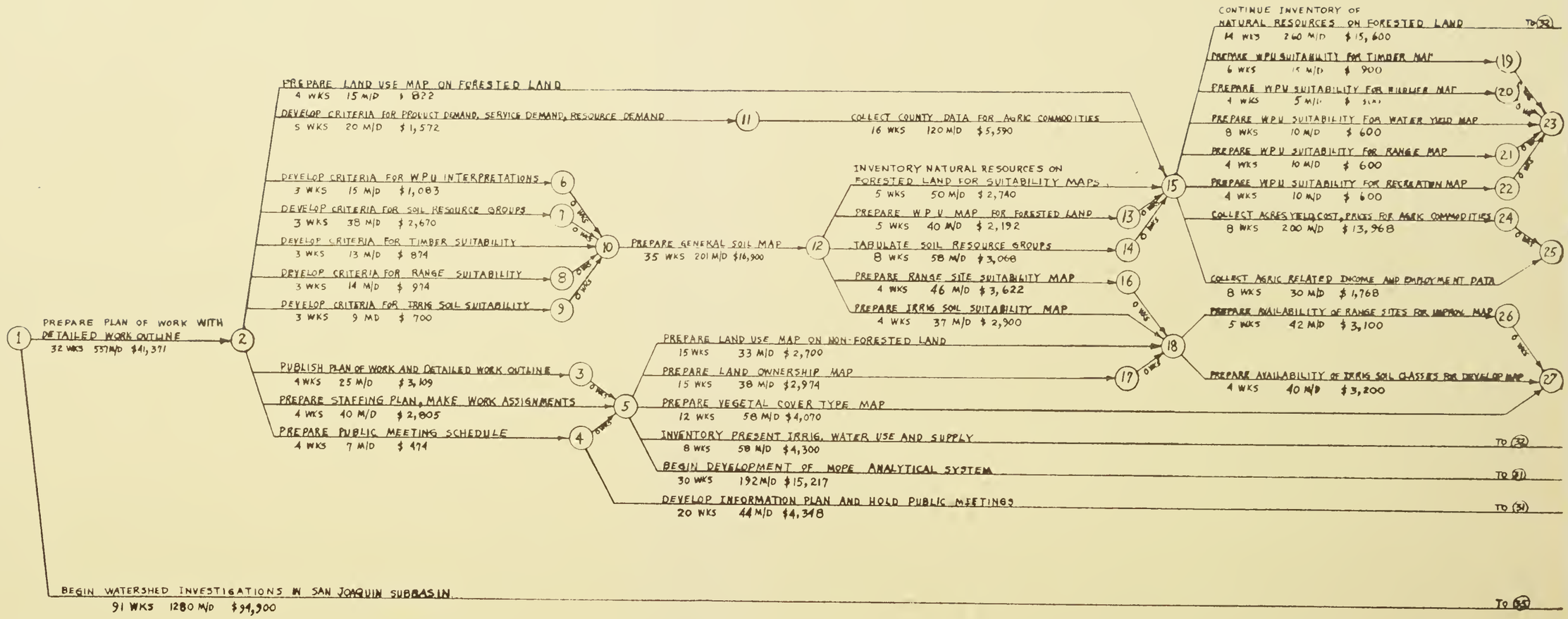
The SCS will be responsible for a progress report, combining inputs from all USDA agencies, to be prepared quarterly and submitted to the FAC. For each major item, these reports should indicate the amount of work accomplished, the percent completed, major problems encountered, and progress with regard to the overall study schedule.

APPENDIX I: DETAILED WORK OUTLINE

The detailed work outline consists of an arrow diagram on pages 2 to 5 and tables of man-day estimates and cost estimates on pages 6 to 9.

The arrow diagram presents the primary relationships of the detailed activities in proper time sequence to provide input data to on-going and future activities. Events are shown in circles and are points in time. Events increase in order from left to right. Activities are shown as arrows which always proceed to the right.

The duration of each activity is shown in work weeks (five days per week). The estimated staffing time needed for each activity is shown in man-days and the estimated cost to complete each activity is shown. The tables present man-day estimates and cost estimates by agency for each activity. Activities of each agency are easily recognized. The listing order follows the sequence in the arrow diagram and is usable as input for the Critical Path Method computer program or the Project Control System program.



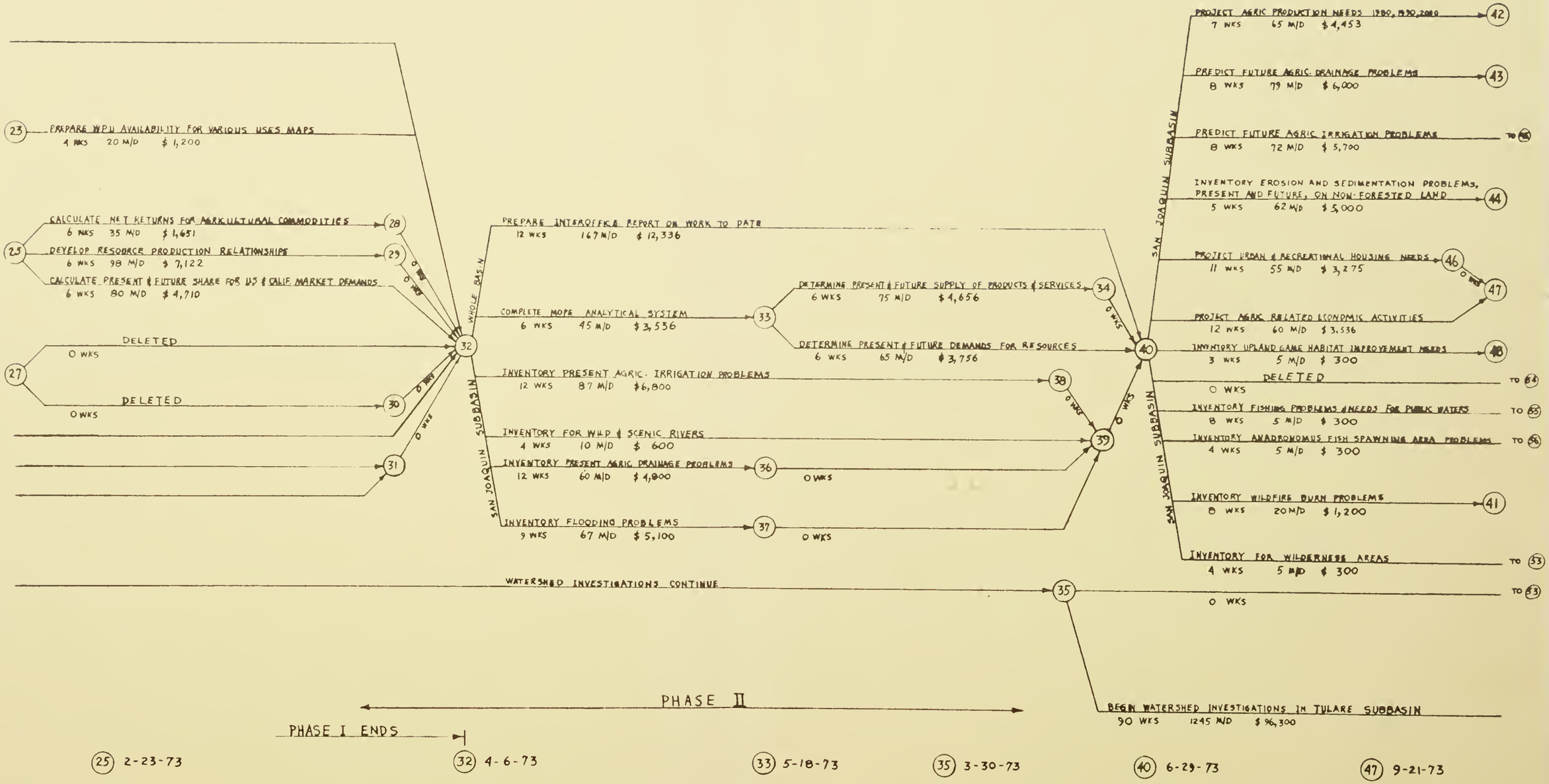
NOTE:

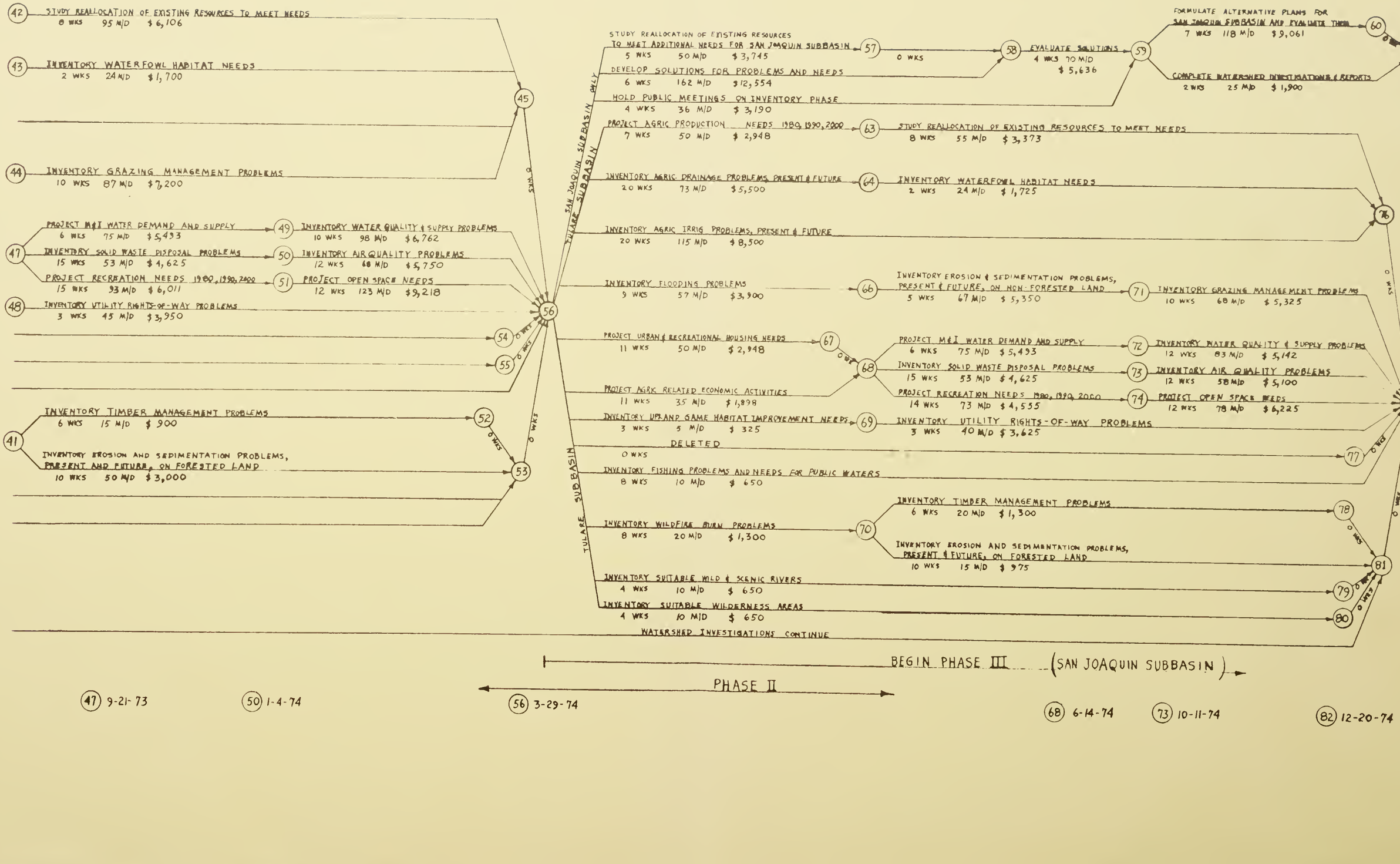
OUTPUT FROM COMPLETED ACTIVITIES AVAILABLE AS INPUT TO OTHER ON-GOING OR FUTURE ACTIVITIES.

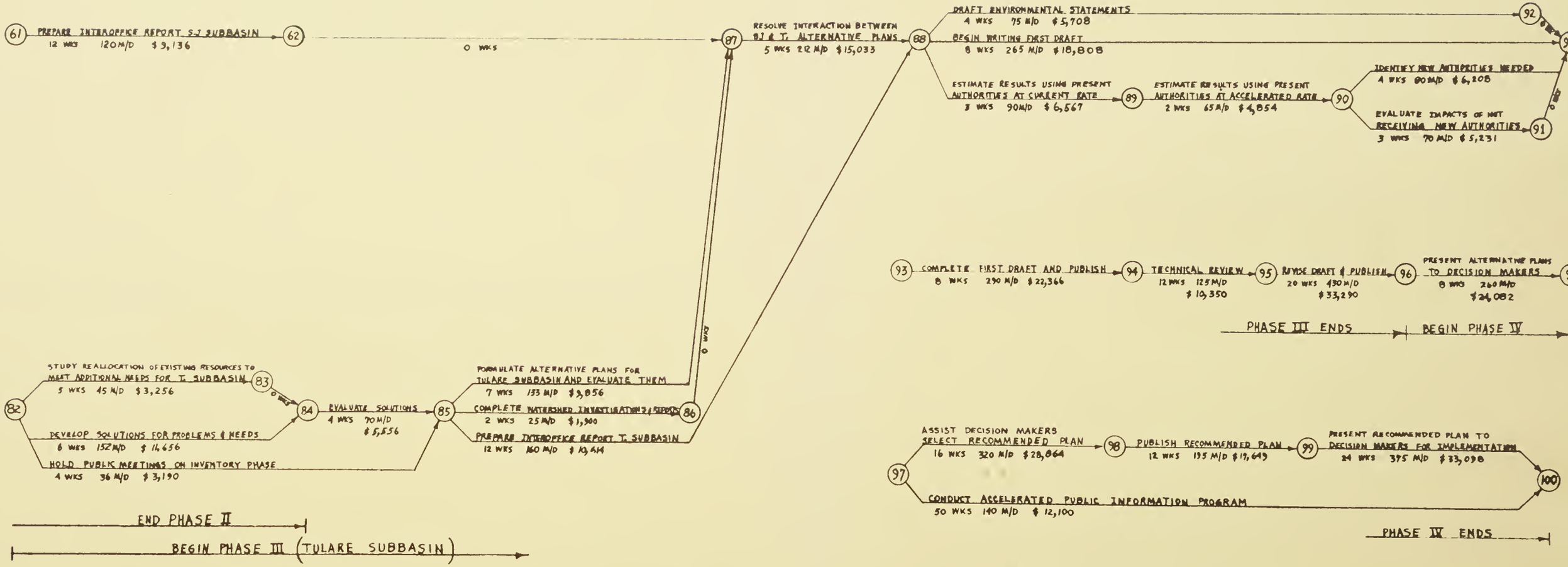
BEGIN PHASE II

PHASE I

(1) 7-1-71 (2) 2-11-72 (10) 3-3-72 (12) 11-3-72 (15) 12-29-72 (25) 2-23-73


23 PREPARE WPU AVAILABILITY FOR VARIOUS USES MAPS
1 WKS 20 M/D $ 1,200
25
CALCULATE NET RETURNS FOR AGRICULTURAL COMMODITIES
6 WKS 35 M/D $ 1,651
28
DEVELOP RESOURCE PRODUCTION RELATIONSHIPS
6 WKS 98 M/D $ 7,122
29
CALCULATE PRESENT & FUTURE SHARE FOR US & CALIF MARKET DEMANDS
6 WKS 80 M/D $ 4,710
0 WKS
27
DELETED
0 WKS
DELETED
0 WKS
30
0 WKS
31
0 WKS
32
WHOLE BASIN
PREPARE INTEROFFICE REPORT ON WORK TO DATE
12 WKS 167 M/D $ 12,336
COMPLETE MOPE ANALYTICAL SYSTEM
6 WKS 45 M/D $ 3,536
33
DETERMINE PRESENT & FUTURE SUPPLY OF PRODUCTS & SERVICES
6 WKS 75 M/D $ 4,656
34
DETERMINE PRESENT & FUTURE DEMANDS FOR RESOURCES
6 WKS 65 M/D $ 3,756
0 WKS
40
SAN JOAQUIN SUBBASIN
INVENTORY PRESENT AGRIC. IRRIGATION PROBLEMS
12 WKS 87 M/D $6,800
38
0 WKS
INVENTORY FOR WILD & SCENIC RIVERS
4 WKS 10 M/D $ 600
INVENTORY PRESENT AGRIC DRAINAGE PROBLEMS
12 WKS 60 M/D $ 1,900
36
0 WKS
39
INVENTORY FLOODING PROBLEMS
9 WKS 67 M/D $ 5,100
37
0 WKS
0 WKS
SAN JOAQUIN SUBBASIN
PROJECT AGRIC PRODUCTION NEEDS 1980, 1990, 2000
7 WKS 65 M/D $ 4,453
42
PREDICT FUTURE AGRIC. DRAINAGE PROBLEMS
8 WKS 79 M/D $ 6,000
43
PREDICT FUTURE AGRIC. IRRIGATION PROBLEMS
8 WKS 72 M/D $ 5,700
TO 62
INVENTORY EROSION AND SEDIMENTATION PROBLEMS, PRESENT AND FUTURE, ON NON-FORESTED LAND
5 WKS 62 M/D $ 5,000
44
PROJECT URBAN & RECREATIONAL HOUSING NEEDS
11 WKS 55 M/D $ 3,275
46
0 WKS
47
PROJECT AGRIC RELATED ECONOMIC ACTIVITIES
12 WKS 60 M/D $ 3,536
INVENTORY UPLAND GAME HABITAT IMPROVEMENT NEEDS
3 WKS 5 M/D $ 300
48
DELETED
0 WKS
TO 64
INVENTORY FISHING PROBLEMS & NEEDS FOR PUBLIC WATERS
8 WKS 5 M/D $ 300
TO 65
INVENTORY ANADROMOUS FISH SPAWNING AREA PROBLEMS
4 WKS 5 M/D $ 300
TO 66
INVENTORY WILDFIRE BURN PROBLEMS
8 WKS 20 M/D $ 1,200
41
INVENTORY FOR WILDERNESS AREAS
4 WKS 5 M/D $ 300
TO 53
WATERSHED INVESTIGATIONS CONTINUE
35
TO 53
0 WKS
BEGIN WATERSHED INVESTIGATIONS IN TULARE SUBBASIN
90 WKS 1245 M/D $ 96,300
PHASE II
PHASE I ENDS
25 2-23-73
32 4-6-73
33 5-18-73
35 3-30-73
40 6-29-73
47 9-21-73


42 STUDY REALLOCATION OF EXISTING RESOURCES TO MEET NEEDS
8 WKS 95 M/D $6,106
43 INVENTORY WATERFOWL HABITAT NEEDS
2 WKS 24 M/D $1,700
44 INVENTORY GRAZING MANAGEMENT PROBLEMS
10 WKS 87 M/D $7,200
45
0 WKS
47 PROJECT M&I WATER DEMAND AND SUPPLY
6 WKS 75 M/D $5,493
INVENTORY SOLID WASTE DISPOSAL PROBLEMS
15 WKS 53 M/D $4,625
PROJECT RECREATION NEEDS 1980, 1990, 2000
15 WKS 93 M/D $6,011
48 INVENTORY UTILITY RIGHTS-OF-WAY PROBLEMS
3 WKS 45 M/D $3,950
49 INVENTORY WATER QUALITY & SUPPLY PROBLEMS
10 WKS 98 M/D $6,762
50 INVENTORY AIR QUALITY PROBLEMS
12 WKS 68 M/D $5,750
51 PROJECT OPEN SPACE NEEDS
12 WKS 123 M/D $9,218
54
55
0 WKS
INVENTORY TIMBER MANAGEMENT PROBLEMS
6 WKS 15 M/D $900
41
INVENTORY EROSION AND SEDIMENTATION PROBLEMS, PRESENT AND FUTURE, ON FORESTED LAND
10 WKS 50 M/D $3,000
52
53
0 WKS
56
SAN JOAQUIN SUBBASIN ONLY
TULARE SUBBASIN
STUDY REALLOCATION OF EXISTING RESOURCES TO MEET ADDITIONAL NEEDS FOR SAN JOAQUIN SUBBASIN
5 WKS 50 M/D $3,745
57
0 WKS
58 EVALUATE SOLUTIONS
4 WKS 70 M/D $5,636
59
FORMULATE ALTERNATIVE PLANS FOR SAN JOAQUIN SUBBASIN AND EVALUATE THEM
7 WKS 118 M/D $9,061
60
0 WKS
61
COMPLETE WATERSHED INVESTIGATIONS & REPORTS
2 WKS 25 M/D $1,900
DEVELOP SOLUTIONS FOR PROBLEMS AND NEEDS
6 WKS 162 M/D $12,554
HOLD PUBLIC MEETINGS ON INVENTORY PHASE
4 WKS 36 M/D $3,190
PROJECT AGRIC PRODUCTION NEEDS 1980, 1990, 2000
7 WKS 50 M/D $2,948
63 STUDY REALLOCATION OF EXISTING RESOURCES TO MEET NEEDS
8 WKS 55 M/D $3,373
INVENTORY AGRIC DRAINAGE PROBLEMS, PRESENT & FUTURE
20 WKS 73 M/D $5,500
64 INVENTORY WATERFOWL HABITAT NEEDS
2 WKS 24 M/D $1,725
INVENTORY AGRIC IRRIG PROBLEMS, PRESENT & FUTURE
20 WKS 115 M/D $8,500
76
0 WKS
INVENTORY FLOODING PROBLEMS
9 WKS 57 M/D $3,900
66 INVENTORY EROSION & SEDIMENTATION PROBLEMS, PRESENT & FUTURE, ON NON-FORESTED LAND
5 WKS 67 M/D $5,350
71 INVENTORY GRAZING MANAGEMENT PROBLEMS
10 WKS 68 M/D $5,325
PROJECT URBAN & RECREATIONAL HOUSING NEEDS
11 WKS 50 M/D $2,948
67
0 WKS
68
PROJECT M&I WATER DEMAND AND SUPPLY
6 WKS 75 M/D $5,493
72 INVENTORY WATER QUALITY & SUPPLY PROBLEMS
12 WKS 83 M/D $5,142
INVENTORY SOLID WASTE DISPOSAL PROBLEMS
15 WKS 53 M/D $4,625
73 INVENTORY AIR QUALITY PROBLEMS
12 WKS 58 M/D $5,100
PROJECT RECREATION NEEDS 1980, 1990, 2000
14 WKS 73 M/D $4,555
74 PROJECT OPEN SPACE NEEDS
12 WKS 78 M/D $6,225
82
PROJECT AGRIC RELATED ECONOMIC ACTIVITIES
11 WKS 35 M/D $1,898
INVENTORY UPLAND GAME HABITAT IMPROVEMENT NEEDS
3 WKS 5 M/D $325
69 INVENTORY UTILITY RIGHTS-OF-WAY PROBLEMS
3 WKS 40 M/D $3,625
DELETED
0 WKS
77
0 WKS
INVENTORY FISHING PROBLEMS AND NEEDS FOR PUBLIC WATERS
8 WKS 10 M/D $650
INVENTORY WILDFIRE BURN PROBLEMS
8 WKS 20 M/D $1,300
70
INVENTORY TIMBER MANAGEMENT PROBLEMS
6 WKS 20 M/D $1,300
78
0 WKS
INVENTORY EROSION AND SEDIMENTATION PROBLEMS, PRESENT & FUTURE, ON FORESTED LAND
10 WKS 15 M/D $975
81
INVENTORY SUITABLE WILD & SCENIC RIVERS
4 WKS 10 M/D $650
79
0 WKS
INVENTORY SUITABLE WILDERNESS AREAS
4 WKS 10 M/D $650
80
0 WKS
WATERSHED INVESTIGATIONS CONTINUE
BEGIN PHASE III (SAN JOAQUIN SUBBASIN)
PHASE II
47 9-21-73
50 1-4-74
56 3-29-74
68 6-14-74
73 10-11-74
82 12-20-74



(82) 12-20-74 (84) 1-31-75 (85) 2-28-75 (87) 4-18-75 (88) 5-23-75 (89) 6-13-75 (90) 6-27-75 (93) 7-25-75 (95) 12-12-75 (97) 6-25-76 (99) 1-7-77

(94) 9-19-75 (96) 4-30-76 (98) 10-15-76 (100) 6-24-77

BEGIN EVENT	END EVENT	TIME ALLOWED WKS	TOTAL ESTIMATE		SCS ESTIMATE		FS ESTIMATE		ERS ESTIMATE	
			MAN DAYS	COST	MAN DAYS	COST	MAN DAYS	COST	MAN DAYS	COST
1	2	32	537	41,371	312	25,600	65	3,471	160	12,300
1	35	91	1280	94,900	1280	94,900				
2	3	4	25	3,109	20	2,700			5	409
2	4	4	7	474	2	200	5	274		
2	5	4	40	2,805	15	1300	20	1096	5	409
2	6	3	15	1,083	5	400	5	274	5	409
2	7	3	38	2,670	13	1,000			25	1670
2	8	3	14	974	9	700	5	274		
2	9	3	9	700	9	700				
2	10	3	13	874	8	600	5	274		
2	11	5	20	1572					20	1572
2	15	4	15	822			15	822		
3	5	0								
4	5	0								
4	31	20	44	4,348	28	3,200	10	548	6	600
5	17	15	38	2,974	33	2,700	5	274		
5	18	15	33	2,700	33	2,700				
5	27	12	58	4,070	33	2,700	25	1370		
5	31	30	192	15,217	65	5,800	37	2055	90	7212
5	32	8	58	4,300	58	4300				
6	10	0								
7	10	0								
8	10	0								
9	10	0								
10	12	35	201	16,200	201	16,900				
11	15	16	120	5,590					120	5590
12	13	5	40	2192			40	2192		
12	14	8	58	3,068	28	1300			30	1768
12	15	5	50	2,740			50	2740		
12	16	4	46	3,622	36	2800	10	822		
12	18	4	37	2,900	37	2900				
13	15	0								
14	15	0								
15	19	6	15	900			15	900		
15	20	4	5	300			5	300		
15	21	4	10	600			10	600		
15	22	4	10	600			10	600		
15	23	8	10	600			10	600		
15	24	8	200	13,968	165	11,900	5	300	30	1768
15	25	8	30	1,768					30	1768
15	32	14	260	15,600			260	15,600		
16	18	0								
17	18	0								
18	26	5	42	3,100	42	3,100				
18	27	4	40	3200	40	3200				
19	23	0								
20	23	0								

BEGIN EVENT	END EVENT	TIME ALLOWED WKS	TOTAL ESTIMATE		SCS ESTIMATE		FS ESTIMATE		ERS ESTIMATE	
			MAN DAYS	COST	MAN DAYS	COST	MAN DAYS	COST	MAN DAYS	COST
21	23	0								
22	23	0								
23	32	4	20	1,200			20	1,200		
24	25	0								
25	28	6	35	1,651					35	1651
25	29	6	98	7122	48	4,000	10	600	40	2522
25	32	6	80	4,710					80	4710
26	27	0								
27	30	0								
27	32	0								
28	32	0								
29	32	0								
30	32	0								
31	32	0								
32	33	6	45	3,536	15	1,300	10	600	20	1636
32	36	12	60	4,800	60	4,800				
32	37	9	67	5,100	67	5,100				
32	38	12	87	6,800	87	6,800				
32	39	4	10	600			10	600		
32	40	12	167	12,336	87	7,100			80	5236
33	34	6	75	4,656	15	1,300	20	1200	40	2156
33	40	6	65	3,756	5	400	20	1200	40	2156
34	40	0								
35	53	0								
35	81	90	1245	96,300	1245	96,300				
36	39	0								
37	39	0								
38	39	0								
39	40	0								
40	41	8	20	1,200			20	1,200		
40	42	7	65	4,453	10	900	5	300	50	3253
40	43	8	79	6,000	79	6,000				
40	44	5	62	5,000	57	4,700	5	300		
40	45	8	72	5,700	72	5,700				
40	46	11	55	3,275	5	400	10	600	40	2275
40	47	12	60	3,536					60	3536
40	48	3	5	300			5	300		
40	53	4	5	300			5	300		
40	54	0								
40	55	8	5	300			5	300		
40	56	4	5	300			5	300		
41	52	6	15	900			15	900		
41	53	10	50	3,000			50	3,000		
42	45	8	95	6,106	10	900	30	1,800	55	3406
43	45	2	24	1,700	19	1,400	5	300		
44	45	10	87	7,200	77	6,600	10	600		

BEGIN EVENT	END EVENT	TIME ALLOWED WKS	TOTAL ESTIMATE		SCS ESTIMATE		FS ESTIMATE		ERS ESTIMATE	
			MAN DAYS	COST	MAN DAYS	COST	MAN DAYS	COST	MAN DAYS	COST
45	56	0								
46	47	0								
47	49	6	75	5,493	40	3,400	5	325	30	1769
47	50	15	53	4,625	48	4,300	5	325		
47	51	15	93	6,011	18	1,500	15	975	60	3536
48	56	3	45	3,950	35	3,300	10	650		
49	56	10	98	6,762	53	3,700	10	650	35	2412
50	56	12	68	5,750	58	5,100	10	650		
51	56	12	123	9,218	83	6,500	10	650	30	2048
52	53	0								
53	56	0								
54	56	0								
55	56	0								
56	57	5	50	3,745	5	400	20	1,300	25	2045
56	58	6	162	12,554	112	8,800	20	1300	30	2454
56	59	4	36	3,190	28	2,600	6	390	2	200
56	63	7	50	2,948	5	400	10	650	35	1998
56	64	20	73	5,500	73	5,500				
56	66	9	57	3,900	57	3,900				
56	67	11	50	2,948	5	400	10	650	35	1898
56	68	11	35	1,898					35	1898
56	69	3	5	325			5	325		
56	70	8	20	1,300			20	1,300		
56	76	20	115	8 500	115	8 500				
56	77	0								
56	79	4	10	650			10	650		
56	80	4	10	650			10	650		
56	82	8	10	650			10	650		
57	58	0								
58	59	4	70	5,636	30	2,700	20	1,300	20	1636
59	60	7	118	9,061	73	5,700	20	1,300	25	2061
59	61	2	25	1,900	25	1,900				
60	61	0								
61	62	12	120	9,136	60	4,900	40	2,600	20	1636
62	87	0								
63	76	8	55	3373	5	400	25	1625	25	1348
64	76	2	24	1,725	19	1,400	5	325		
66	71	5	67	5,350	57	4,700	10	650		
67	68	0								
68	72	6	75	5,493	40	3,400	5	325	30	1768
68	73	15	53	4,625	48	4,300	5	325		
68	74	14	73	4,555	18	1,500	10	650	45	2405
69	82	3	40	3,625	35	3,300	5	325		
70	78	6	20	1,300			20	1,300		
70	81	10	15	975			15	975		
71	82	10	68	5,325	63	5,000	5	325		
72	82	12	83	5,142	48	3,200	5	325	30	1617

BEGIN EVENT	END EVENT	TIME ALLOWED WKS	TOTAL ESTIMATE MAN DAYS	TOTAL ESTIMATE COST	SCS ESTIMATE MAN DAYS	SCS ESTIMATE COST	FS ESTIMATE MAN DAYS	FS ESTIMATE COST	ERS ESTIMATE MAN DAYS	ERS ESTIMATE COST
73	82	12	58	5,100	58	5,100				
74	82	12	78	6,225	73	5,900	5	325		
76	82	0								
77	82	0								
78	81	0								
79	81	0								
80	81	0								
81	82	0								
82	83	5	45	3,256	5	400	20	1,300	20	1556
82	84	6	152	11,656	112	8,800	20	1,300	20	1556
82	85	4	36	3,190	29	2,600	6	390	2	200
83	84	0								
84	85	4	70	5,556	30	2,700	20	1,300	20	1556
85	86	2	25	1,900	25	1,900				
85	87	7	133	9,856	73	5,700	40	2,600	20	1556
85	88	12	160	10,614	60	4,900	40	2,600	60	3114
86	87	0								
87	88	5	212	15,033	92	7,600	60	3,900	60	3533
88	89	3	90	6,567	35	2,800	40	2,600	15	1167
88	92	4	75	5,708	35	2,900	20	1,300	20	1508
88	93	8	265	18,808	185	13,400	60	3,900	20	1508
89	90	2	65	4,854	35	2,800	20	1,300	10	754
90	91	3	70	5,231	35	2,800	20	1,300	15	1131
90	93	4	80	6,208	40	3,400	20	1,300	20	1508
91	93	0								
92	93	0								
93	94	8	290	22,366	220	17,400	30	1,950	40	3016
94	95	12	125	10,350	95	8,400	30	1,950		
95	96	20	430	33,290	300	23,800	30	1,950	100	7540
96	97	8	260	24,082	230	21,900	10	650	20	1532
97	98	16	320	28,864	260	24,500	20	1,300	40	3064
97	100	50	140	12,100	110	9,800	20	1,300	10	1,000
98	99	12	195	17,619	160	15,200	20	1,300	15	1,149
99	100	24	375	33,098 1/	325	29,500 1/	20	1,300 1/	30	2,298 1/
TOTAL ACTIVITY COSTS				823,797		670,200		112,541		141,056
TOTAL OVERHEAD COSTS				165,703		63,000		37,359 2/		65,344 3/
TRAVEL COST				9,800		4/		9,800		4/
TOTAL MAN DAYS			12,261		8,307		1,819		2135	5/
TOTAL STUDY COST				1,099,300		733,200		159,700		206,400 6/

1/ River Basin funds not authorized for this activity.

2/ Includes 10% for Washington.

3/ Includes 21% for Washington and 7% for FAC and management.

4/ Travel costs are assigned to each activity.

5/ Includes professionals and statistical clerks.

6/ Includes professionals, statistical clerks, and secretarial salaries; benefits; travel; and computer costs.

APPENDIX II - PROPOSED MOPE ANALYTICAL SYSTEM

Introduction

The plan of study stresses the importance of Multiple Objective Planning and Evaluation (MOPE). The purpose of this appendix is to discuss the MOPE analytical system in more detail and show its interrelationship to the overall study planning process. This system is not a computer model in itself. The computer will be used extensively in the study as a tool to store and analyze data.

Chart I shows a detailed flow diagram of the proposed system and displays what data are fed into subsystems, what information is printed or stored, and how this information is used in other subsystems. Many of the finer points related to specific data inputs, outputs, and methodology will be defined in more detail after the criteria phases of the study (events 10 and 11 of the detailed work outline) and public meetings with the local people.

The following discussion refers to the total MOPE analytical system and discusses each subsystem in detail. It must be remembered that the specific form of much of the data will be developed in the criteria section of the study.

Subsystem I - Current Uses of Resources

The purpose of this subsystem is to input and analyze current resource use data from the initial inventory phase of the study. The data will be coded by San Joaquin Subbasin, Tulare Subbasin, SRG, and WPU.

The inputs include: (1) generalized soils data in acres; (2) land use data, forested and nonforested, in acres; (3) land ownership data, private and public, in acres; (4) water use data, surface and groundwater, in total acre-feet by land use; (5) resource production relationships data in units required per acre and units produced per acre by land use; and (6) acreage and yields per acre of major commodities. Most of the above data are fairly self-explanatory (also see detailed work outline) with the exception of resource production relationships. In general, this information states that for every possible land use stated it will be shown what the yield or production is with an assumed bundle of inputs. Additionally, negative effects such as pollution will be shown as an output and cost when applicable. For example, tree nuts may yield one ton per acre and use three acre-feet of water, one acre of given soil, two units of labor, and produce drainage effluents of 25 ppm of nitrates. On another soil the yield may be 1.5 tons, three-acre-feet of water used, two units of labor and zero ppm of nitrates. An example of timber production may be 5,000 board feet, one acre of a given forest resource, eight units of labor, and .02 tons of sediment and .08 acre-feet of water produced.

The outputs of the Subsystem I are current use of resources by land use for the San Joaquin Valley Basin, San Joaquin Subbasin, Tulare Subbasin SRG, and WPU. This information is printed and also stored to be used as an input into Subsystems II and III.

Subsystem II - Future Supply of Resources Without Plan

The purpose of this subsystem is to evaluate the future supply of resources given the current and projected suitability and availability. Technological changes which will take place without the plan will be considered and resource production relationships will be adjusted. Current resource problems (those originally conceived) will be projected into the future, and production relationships and availability of resources will be adjusted.

The inputs include: (1) current use of resources on tape from Subsystem I and the following card inputs; (2) availability of range sites and irrigable soils, in acres; (3) availability of forest resources, in acres; (4) availability of water, surface and ground, in acre-feet; (5) availability of labor, in man-months; (6) availability of other natural resources such as fish and wildlife in numbers per acre; and (7) adjusted resource production relationships. Resource availability will be specified by San Joaquin Valley Basin, San Joaquin Subbasin, Tulare Subbasin, SRG, and WPU.

The outputs of Subsystem II are the total resource supply (timber, irrigable soils, open space wilderness, water, labor, etc.) by the above areas that result from alternative assumptions about technology and resource problems and needs. These data are printed and stored on tape to be used as inputs into Subsystem IV.

The methodology involves the tabulation of resource suitability, the subtraction from suitability of those resources committed to uses which either by physical or economic consideration are not available for alternative uses; the projection of technological change (in general, just a trend

analysis given past history) which will affect resource availability; and the consideration of future land use which might restrict resource availability (such as urbanization, construction of dams, etc.). This will involve listing proposed resource projects which are: (1) existing or under construction; (2) authorized; and (3) possible future. Also projections will be made of urbanization rates (primarily from other studies), second home developments, and any other resource restricting activities such as zoning. One of the critical study problems will be the determination of what stock and flow resources will be significantly affected in the future with or without man's actions. Also, resource mobility will have to be determined.

Subsystem III - Current Production of Products and Services

The purpose of this subsystem is to relate the current use of resources (Subsystem I) and the current production of goods and services to the net returns of resource owners and agricultural related income and employment. A first approximation to the current comparative advantage of alternative resource using activities (net returns/acre) for the San Joaquin Valley Basin will be made.

The inputs include: (1) current use of resources on tape from Subsystem I and the following card inputs; (2) acreages, yields, production costs (by major components), and prices of major agricultural, forestry, and recreational commodities; (3) agricultural, forestry, and recreational employment and related income; and (4) non-market outputs (externalities).

The printed and stored outputs of Subsystem III include: (1) a set of budgets, in terms of cost of production and net returns per acre for the

major commodities by the San Joaquin Subbasin, Tulare Subbasin, WPU, and SRG; (2) a matrix relating direct and indirect employment to the major activities; (3) a matrix relating direct and indirect income to the major activities; and (4) display of non-market outputs (externalities).

The methodology involves the tabulation of production cost data by San Joaquin Valley counties from Agricultural Extension Service budgets into variable and fixed costs, harvest and nonharvest cost, total investment and operating capital cost, and water, labor, fertilizer, family labor, and management cost; the collection of a price series representative of the average price over the last 5 years for major commodities; the tabulation of normalized prices for major commodities; and the development of production cost per acre and net returns per acre (cost-total returns) for major commodities by the San Joaquin Subbasin, Tulare Subbasin, WPU and SRG for alternative price assumptions. Coordination with SCS and FS field staffs will be maintained to insure that the budgets are representative of the study area and that unique problems are considered. Agricultural, forestry, and recreational related income and employment data will be tabulated from various input-output (I-O) models that have been developed for California.

The outputs of this system, primarily production cost, will have to be flexible enough so they can be developed into budgets for a more detailed break down of SRG's, WPU's, and selected watersheds. The budgets will also have to reflect particular problems such as drainage, erosion, and changes in quality factors. Because the budgets will be the primary input into the objective functions of the MOPE analysis, they will also have to be

flexible enough to reflect national economic development cost and returns, regional development cost and returns; and environmental quality cost and returns. The criteria activities will provide additional methodology as to how this will be done.

Subsystem IV - Future Supply of Products and Services Without Plan

The purpose of Subsystem IV is to relate the cost of production of major commodities and future resource supply to the future production possibilities of the San Joaquin Valley Basin under alternative assumptions of net returns to resource owners and projected resource production relationships. The subsystem will also consider what the future production possibilities will be if the objective function is to optimize NED, RD, or EQ, or a combination of any of the three.

The inputs are: (1) future supply of resources on tape from Subsystem II; (2) current production and net returns of products and services on tape from Subsystem III and the following card inputs; (3) projected resource production relationhsips in units required per acre and units produced per acre; and (4) MOPE functions, in net returns per acre and quantities produced per acre.

The printed and stored output of Subsystem IV will give the total potential physical supply of products and services given the interaction of agriculture, forestry, and recreation with the resource base of the basin. A "stepped" relationship between quantity and price of major commodities will be developed under the alternative assumptions of NED, RD, and EQ. These outputs will be used in Subsystem VI and VII.

The methodology involves the development of two linear programming (L.P.) models, one for agricultural lands and one for forested lands, and the linking of these two models. This is probably the most important subsystem of the MOPE analytical system because the L.P. models will also be used to determine the present and future demand for natural resources. The L.P. models will have the following components and characteristics: (1) the data fed into the subsystem will be coded (from Susbsystem I) so that the resource using activities (agriculture, forestry, and recreation) can be related to planning units (WPU and SRG's) and also to the resource base, regional market restraints and MOPE objectives; (2) each resource using activity (e.g., production of agricultural commodities, timber, fish and wildlife, recreation, water, sediment, drainage effluents) will be coded by planning areas and net returns or cost will be specified to be used in the objective function (see Subsystem III); (3) each resource using activity will have specified production relationships which relate outputs (e.g., yields of timber and agricultural commodities, visitor days, sediment, drainage effluent, water) to inputs (e.g., water -- acre-feet per acre, labor -- man-weeks per acre, land -- acres (see Subsystem I); (4) resource restraints by planning areas will be specified in the models (see Subsystem II) as upper bounds which cannot be exceeded without a plan; (5) market restraints for the San Joaquin Valley Basin and the San Joaquin and Tulare Subbasins (see Subsystem V) will be specified as upper bounds to production and acreage of commodities which cannot be exceeded without significantly affecting market prices, exceeding federal acreage allotments, or causing excessive financial risk to growers; (6) transfer activities will

be specified which allow for the transfer of water, quantity and quality, from the forested lands to the agricultural lands and from agricultural lands to drainage systems and rivers (e.g., sediment and water production from forested lands in the upper watersheds will be transferred to the lower watershed, and agricultural drainage effluents will be transferred to drainage systems; (7) reality restraints will be included which will not allow the production of any commodity to be exceeded or be replaced by a certain percentage of the existing acreage (e.g., say for 1980 production has to be at least 75 percent of 1970, but cannot exceed 125 percent); (8) environmental restraints will be included which will not allow water quality to exceed certain ppm of effluent or sediment production not to exceed so many acre-feet for a given planning unit; (9) zoning restraints such as urbanization, second homes, wilderness and scenic rivers will be included so that certain lands will be restricted in use; (10) employment restraints will be incorporated so it will be possible to specify certain unemployment rates by basin; and (11) the objective function will be specified so that the model can optimize net returns to the nation, to the region, or to the nation and region subject to certain environmental restraints.

The restraints of the model will all be related to those activities of planning units which they affect. The model will not only give optimum solutions to specific objective functions but it will also show how various components of NED, RD, and EQ are affected (e.g., a certain allocation of resources will provide so many jobs, generate so much income and produce a certain amount of sediment and drainage effluent).

After the two models are debugged and reduced to a workable size, they will be combined by transfer activities (e.g., water quantity and quality)

and activities which compete for the same resources (e.g., timber, grazing, recreation). The mathematical presentation of these models and an example of the L.P. matrix is presented in the ERS detailed work outline.

Subsystem V - Future Demand for Products and Services

The purpose of this subsystem is to estimate future demand restraints which might exist for products and services under the assumptions of a constant price and varying prices. These demand restraints will provide the basis for competition within the San Joaquin Subbasin and Tulare Subbasin the WPU planning units, the detailed SRG planning units and for the inter-regional competition with the western United States through the SRG coding.

The inputs include: (1) current production of products and services on tape from Subsystem III and the following on cards; (2) framework projections (OBERS, Base Plan, Series D) of future shares of the market for California, the Tulare Subbasin, and the San Joaquin Subbasin; (3) various market share projections done by the University of California; and (4) other secondary data such as quantities, prices, per capita consumption, imports, exports, population, and income.

The printed and stored outputs of Subsystem V are: (1) projected market shares (constant and changing) of major commodities both in quantity and acreage for the San Joaquin Valley Basin, the San Joaquin Subbasin, and the Tulare Subbasin; and (2) price and income elasticities, and long-run price flexibilities of major commodities for the San Joaquin Valley Basin. These outputs will be used in Subsystems VI and VII.

The methodology involves the projections of market shares -- percent California of U. S., percent San Joaquin Valley Basin of California and percent San Joaquin Subbasin and Tulare Subbasin of San Joaquin Valley Basin. Framework data will be used, but for many commodities more detail will be needed (e.g., in California, there are 22 noncitrus fruits). Production and acreage data for the past 25 years will be used. These will be tabulated and percentages will be plotted and projected using graphic analysis. Regression will also be used to fit percentages against time. Functional relationships will be developed for agricultural commodities using regression analysis and considering prices and quantities in the study area, production in the rest of the United States, imports and exports, disposable income, population, and per capita consumption. Projection will be made of quantities and acreages of commodities which will hold prices constant in the future and alternative quantities and acreages at varying prices. Because much of the secondary data are by counties, some field work may be needed to check for accuracy.

Subsystem VI - Future Demand for Resources Without Plan

The purpose of this subsystem is to estimate the future demand for natural resources (quantity and value) given the future availability of resources and demand for products and services. The value of resources for alternative uses will be estimated. The quantity of resources needed to produce alternative levels of goods and services will also be estimated. The demand for resources will be derived considering the supply and allocation of resources to alternative uses in order to optimize the net social benefits to society under the alternatives of NED, RD, and EQ.

The inputs to the system include: (1) the current uses of resources on tape from Subsystem I; (2) the future supply of resources on tape from Subsystem II; (3) the current production and net returns of commodities on tape from Subsystem III; (4) the future supply of products and services on tape from Subsystem IV; and (5) the future demand for products and services on tape from Subsystem V.

The printed and stored outputs of Subsystem VI will be "stepped" relationships between the quantity and value of resources (primarily alternative soils, water, timber, and various recreational resources) for the planning units of the study area. There will also be a tabulation of resources used at alternative levels of supply of products and services. The resource demand relationships (both quantity and value) will be presented considering the maximization of NED, RD, and various combinations of NED and RD given environmental restraints. These data will be used in Subsystem VII.

The methodology involves using the same L.P. model as in Subsystem IV and allowing the quantities of and demand for resources to vary to see what impacts this would have on the value of resources. The model will evaluate the interaction of agriculture, forestry, and recreation with the resource base of the basin.

Subsystem VII - Future Needs Without Plan

The purpose of this subsystem is to estimate future needs which will be required from the resource base. Needs will include both physical and economical and can vary depending on which objective function (NED, RD, EQ) is optimized. In general, needs refer to the comparing of supply

of products and resource with the demand for products and resources. Both price and quantity are to be considered.

The inputs into the system involve the stored outputs of the previous subsystems (I-VI) and any additional information generated during the inventory phase of the study. In particular, any new problems and objectives developed during public meetings will also be incorporated.

The printed and stored outputs of the system will be: (1) future satisfied and unsatisfied needs by land uses and by resources; and (2) agricultural and forestry production needs for 1980, 1990, and 2000. These outputs will be used in Subsystem VIII. It is difficult to conceive all possible needs, but some examples are: (1) needs for additional water for municipal and industrial, irrigated agriculture, and fish and wildlife; (2) needs for land to be converted to another use such as dryland to irrigated, brush to timber and grazing, wilderness and open space; (3) needs for additional skilled labor and needs for programs to help educate labor; (4) needs for additional water transferred within a watershed or between watersheds; (5) the general needs for reallocating resources to solve problems; and (6) the general needs for additional resource development, management, or conservation.

The methodology involves the combining of the results from Subsystems I-VI and tabulating differences where demands exceed supplies. Needs will be tabulated by the San Joaquin Subbasin, Tulare Subbasin, SRG and WPU. The results of the L.P. will give values of resources which will approximate economic needs (i.e., greater the value greater the need). The L.P. model, by use of parametric programming, will also give an approximation as to what prices

of commodities, what resource production relationships, and/or what resource conversions would be needed to meet product demands.

Subsystem VIII - Reallocate Existing Resource to Meet Basin Needs Without Plan and With Plan

The first purpose of this subsystem is to complete the "without plan or project" analysis which all future solutions and alternative plans will use as a base.

The inputs include the unsatisfied needs on tape from Subsystem VII. The printed and stored output will be satisfied and unsatisfied needs given the reallocation of resources within the San Joaquin Valley Basin without a plan. This output will be reused by Subsystem VIII for with plan or project analysis.

The methodology involves the rerunning of the L.P.'s and the combining of the agricultural and forestry L.P. It is extremely difficult to talk about the reallocation of broad resource groups such as ground and surface water, and forested lands, without the inclusion of a plan or project. Some possible exceptions might be: the reuse of drainage water, additional groundwater pumping, importation of additional surface water, exportation of a problem out of the basin and the possible changing of certain institutional restraints. In general, the restraints, production relationships, and objectives function can be changed within the model to see if a need could be met with the existing resource base without a plan.

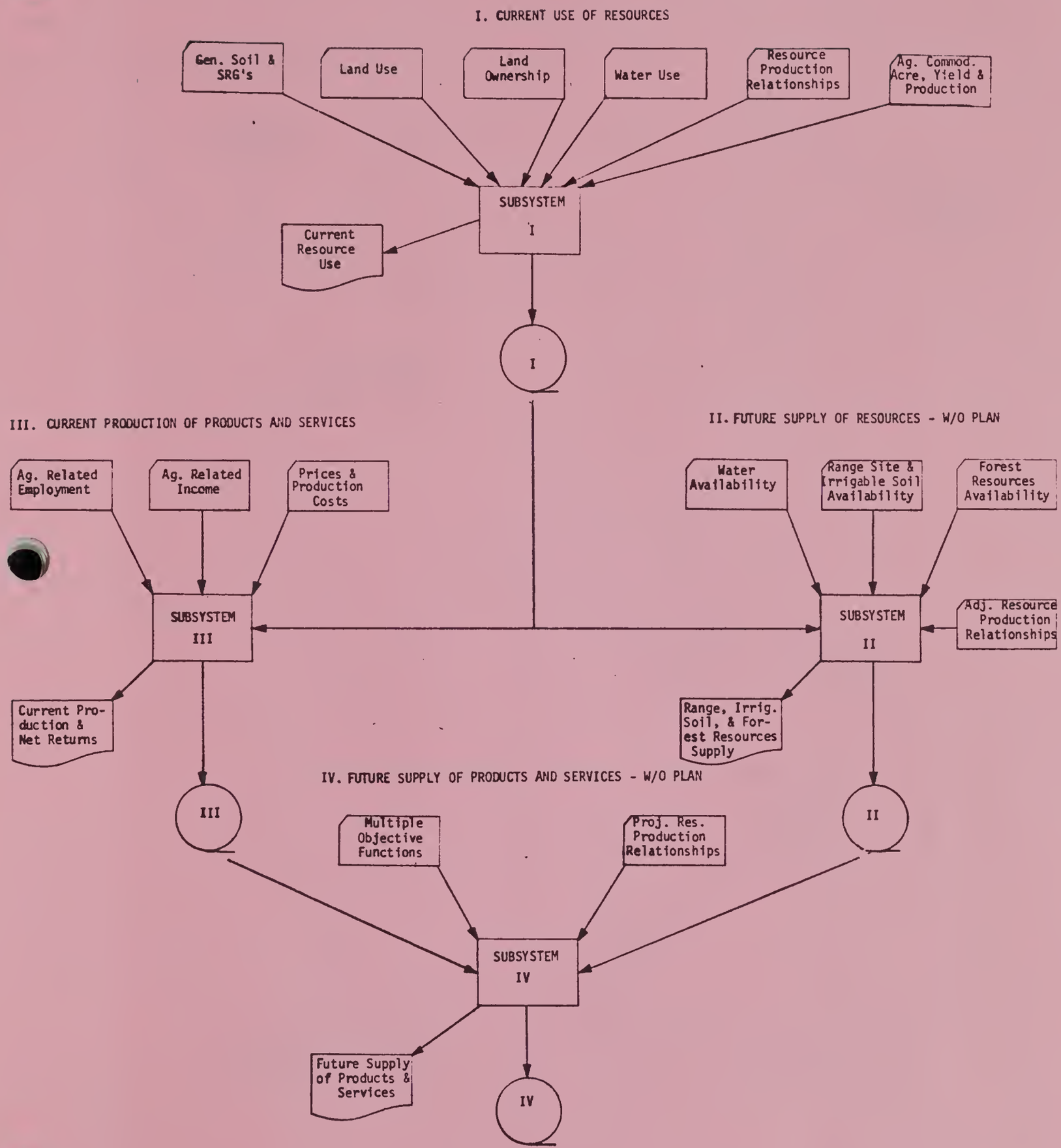
This completes the overall San Joaquin Valley Basin analysis (through event 45 of the detailed work outline).

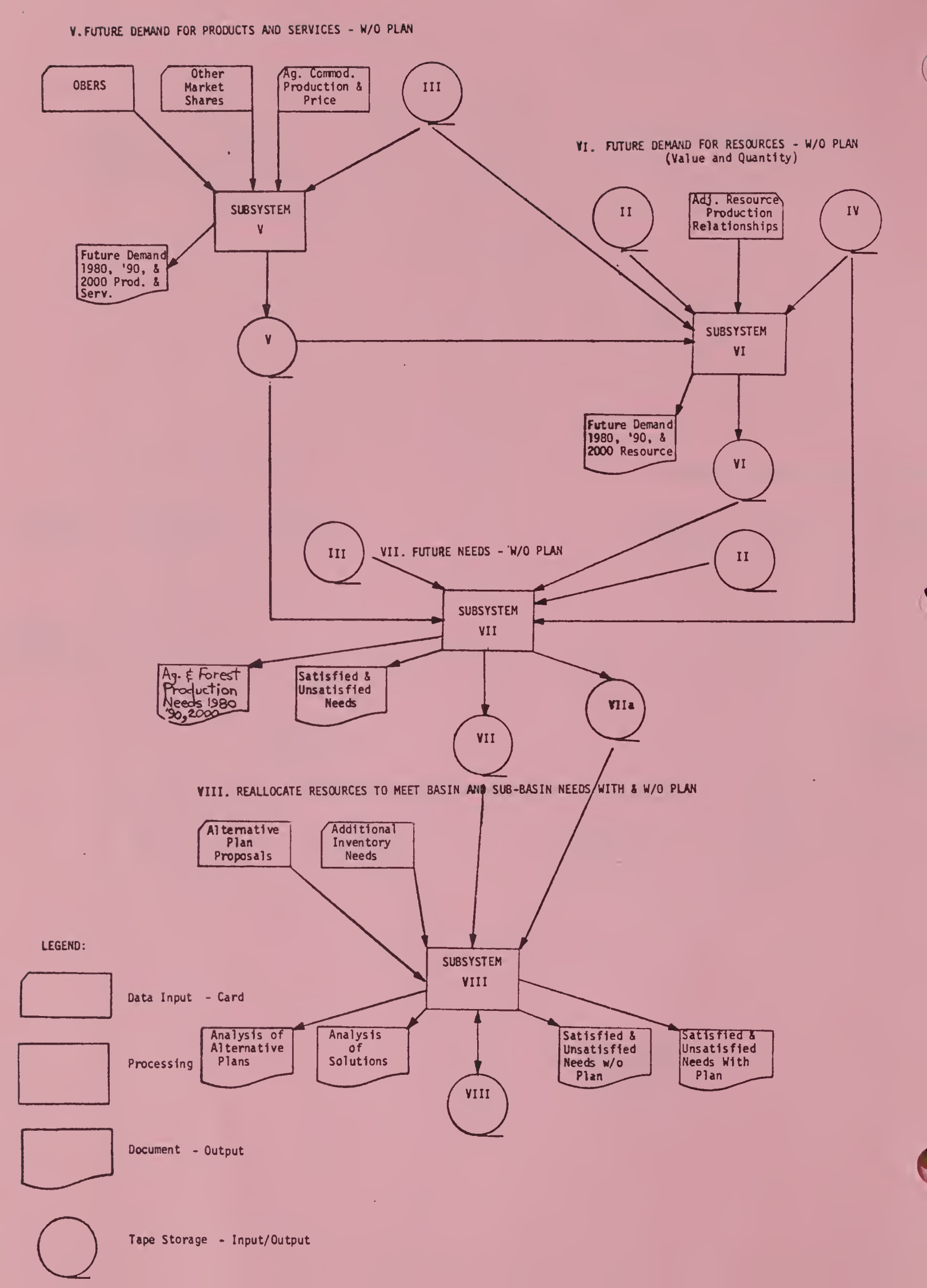
Subsystem VIII will be updated by card inputs and rerun after the San Joaquin Subbasin and after the Tulare Subbasin detailed inventories of additional problems and needs have been completed. Each run will involve the reallocating of existing resources to meet the new needs.

The second purpose of Subsystem VIII is to analyze solutions to problems and needs--with project. This will involve rerunning the L.P. with the new data from the proposed solution (e.g., water developed from forested lands and used for agriculture, and the changing of lands from one SRG to another SRG because of drainage). In general, production relationships, objective functions and/or resource restraints will be varied to reflect a solution.

The third purpose of Subsystem VIII is to analyze alternative plans for each subregion--with plan. The results will be tabulated by the accounts of NED, RD, EQ. The benefits and costs for each plan will be tabulated. The tabulation will show not only changes in monetary values but will also show such things as number of people employed, quantity of resources used and unused, and various environmental variables such as sediment, water quantity and quality, and drainage effluents. Any interactions between the San Joaquin Subbasin and the Tulare Subbasin alternative plans will also be tabulated.

CHART I - MOPE ANALYTICAL SYSTEM




V. FUTURE DEMAND FOR PRODUCTS AND SERVICES - W/O PLAN
OBERS
Other Market Shares
Ag. Commod. Production & Price
III
SUBSYSTEM V
Future Demand 1980, '90, & 2000 Prod. & Serv.
V
VI. FUTURE DEMAND FOR RESOURCES - W/O PLAN (Value and Quantity)
II
Adj. Resource Production Relationships
IV
SUBSYSTEM VI
Future Demand 1980, '90, & 2000 Resource
VI
III
VII. FUTURE NEEDS - W/O PLAN
II
SUBSYSTEM VII
Ag. & Forest Production Needs 1980 '90, 2000
Satisfied & Unsatisfied Needs
VII
VIIa
VIII. REALLOCATE RESOURCES TO MEET BASIN AND SUB-BASIN NEEDS WITH & W/O PLAN
Alternative Plan Proposals
Additional Inventory Needs
SUBSYSTEM VIII
Analysis of Alternative Plans
Analysis of Solutions
Satisfied & Unsatisfied Needs w/o Plan
Satisfied & Unsatisfied Needs With Plan
VIII
LEGEND:
Data Input - Card
Processing
Document - Output
Tape Storage - Input/Output

APPENDIX III: GLOSSARY

DEMAND -- The range of quantity of any particular commodity, service, or benefit that will be purchased on a market or groups of related markets at a point in time given price or series of prices.

DRAINAGE EFFLUENT -- Excess gravitational water which may contain varying amounts of suspended solids, total dissolved solids (from irrigation water, leached from the soil, fertilizers, or soil amendments), organic and inorganic pesticides which have been collected by a drainage system. It may derive from surface water or from water passing through soil and may be of a quality suitable for reuse or it may be of no further economic use at the time and place of its occurrence.

ECONOMIC BASE -- The economic characteristics (e.g., quantities of resources, demand for products, supply of investment goods, quantity and quality of labor force, marginal capital-output ratio, production relationships, stage of development of the region) that contribute to the region's income and growth and economic trends and cycles of the region. The economic base considers: (1) basic activities which produce and distribute goods and services for export and (2) service activities whose goods and services are consumed within the region.

EXTERNAL DISECONOMIES -- Costs or adverse effects expected to be incurred as a result of project action by others than those expected to bear the incurred costs necessary to accrue direct or primary benefits.

EXTERNAL ECONOMIES -- Benefits that accrue as a result of project action to others than direct primary beneficiaries.

LAND CAPABILITY CLASSIFICATION -- An interpretative grouping made primarily for agricultural purposes. Classification begins with individual soil-mapping units. Arable soils are grouped according to their potentialities and limitations for sustained production of the common cultivated crops that do not require specialized site conditioning. Non-arable soils (soils unsuitable for longtime sustained use for cultivated crops) are grouped according to their potentialities and limitations for the production of permanent vegetation and according to their risks of soil damage if mismanaged. Soils are placed in eight capability classes. The risks of soil damage or limitations in use become progressively greater from Class I to Class VIII.

LINEAR PROGRAMMING -- A mathematical technique which is concerned with problems involving the optimization of a linear objective function (e.g. net returns to resources) subject to a set of linear constraints (e.g. availability of resources, market shares, and environmental standards) imposed on the variables of the objective function.

MIADS -- Acronym for "Map Information and Display System" which is a computer oriented system that can create and maintain a master file of letter and number coded data for a series of maps, translate or convert sets of codes from one or two base maps to a new set of codes on a new map, combine or merge original or translated codes from two maps to derive a new map, perform frequency counts and expansions of the various codes and summarize the contents of a map, and graphically display the maps on a printer.

MULTIPLE USE -- The management of all the various renewable surface resources so that they are utilized in the combination that will best meet the needs of society, without impairment to the productivity of the land, and with consideration being given to the relative values of the various resources, and not necessarily the combination of uses that will give the greatest dollar return or the greatest unit output.

NEEDS -- With respect to resources, the economic need is a measure of the difference between the demand and supply function of the resource for the area where demand exceeds supply. In this context both price and quantity relationships for resources are considered.

NET BENEFIT -- The net gain from goods and services that improve the welfare of the community as a whole. The net gain is the resultant of all public and private gains and losses.

NORMALIZED PRICES -- The long term trend of prices, that are expected to be in effect after adjustment for seasonal and cyclical fluctuation.

PARAMETRIC PROGRAMMING -- A provision where the sensitivity of the optimum solution of the linear programming model is tested. The objective function values (prices and cost) and restraints (resource and market levels, environmental standards, etc.), are varied in increments in order to see the effect on the optimum solution and resulting activity levels.

PL 566 PROJECTS -- Projects authorized by the Watershed Protection and Flood Prevention Act (Public Law 566, 83rd Congress, as amended) allows the U.S. Department of Agriculture to assist sponsoring local organizations plan and carry out a program for the development, use, and conservation of the Nation's soil and water resources. The primary purpose must be flood prevention, irrigation, or drainage; other purposes such as a recreation, fish and wildlife development, municipal and industrial water supply, and other soil and water management measures may also be included. The project must cover a watershed or subwatershed area of not more than 250,000 acres. No structure providing more than 12,500 acre-feet of floodwater detention capacity or more than 25,000 acre-feet of total capacity may be included. Except for land rights, the program may provide federal cost-sharing of all installation costs for flood prevention, and up to 50 percent of installation costs for all other purposes, except municipal and industrial water supply.

PRICE ELASTICITY OF DEMAND -- The percentage change in the quantity demanded given a one percent change in the price of the same commodity. It depends primarily upon percentages change and is independent of units used to measure quantity and price.

PRICE FLEXIBILITY -- The percentage change in commodity price associated with a one percent change in the quantity available and demanded of the same commodity, given assumed production levels in the rest of California, rest of the U.S., substitutes and compliments, and levels of real income.

PRODUCTIVITY -- The output of goods and services per unit of land, labor, capital, water, and management (e.g. output per man-hour).

PRODUCTION RELATIONSHIP -- Amount of a production input that is commonly associated with a given amount of production output or vice versa. An example would be how much coal is commonly used in producing a unit of steel.

RESOURCE DERIVED DEMAND -- The derivation of resource demand schedules (e.g. water) from the demand schedules for the outputs produced by the resources and the production relationships of the resources and outputs.

SHARE OF THE MARKET, CURRENT SHARE -- The average production level for the last five years for the San Joaquin Valley Basin, San Joaquin Subbasin and Tulare Subbasin, expressed as a percentage of the total U.S. production and California production.

SHARE OF THE MARKET, PROJECTED CONSTANT SHARE -- The current percentage share of the market multiplied times the projected 1980, 1990, and 2000 U.S. production levels.

SHARE OF THE MARKET, PROJECTED CHANGING SHARE -- The projected share of the market in 1980, 1990, and 2000 based on past trends of production and acreage for the San Joaquin Valley Basin, San Joaquin Subbasin, Tulare Subbasin, and California. Consideration will be given to funded and authorized resource projects which might affect future production.

SHARE OF THE MARKET, PROJECTED CONSTANT PRICE -- The 1980, 1990, and 2000 production levels for California and the San Joaquin Valley Basin which will hold real prices at the 1966-1970 price levels. Consideration will be given to changes in population, per capita consumption, real income levels, and price flexibilities.

SOIL ASSOCIATION -- A group of defined and named soils associated together in a characteristic geographic pattern but not necessarily similar patterns. Each soil association is named for the major soil series it contains and differs from other soil associations by having contrasting soil properties or different potentialities.

SOIL RESOURCE GROUP -- A broad grouping of soils that have similar cropping patterns, yield characteristics, responses to fertilizers, management, and land treatment measures. Land capability units were used to fabricate general groups which were then subdivided into groupings.

Criteria used to place soils into groupings include the following soil qualities and characteristics: effective soil depth, texture of the 10-40 inch control section, drainage, slope, nutritional deficiency, excess salinity and sodium. Potential evapotranspiration at 32°F and Land Resource Areas were also used as criteria.

Groupings were made from soil associations mapped in county general soil maps prepared by Soil Conservation Service and from Pacific Southwest Hydrologic Inventory mapping performed by Forest Service.

STOCK RESOURCES VS. FLOW RESOURCES -- Stock resources are resources that can be permanently expended and whose quantity is usually expressed in absolute amounts rather than in rates. Examples are coal and petroleum. Flow resources are not permanently expendable under usual circumstances. They are commonly expressed in annual rates at which they are regenerated. Examples are fresh-water runoff and timber.

SUPPLY -- A range of amounts of a good, service, or benefit that will be available on a market or group of related markets at a point in time given a price or series of prices.

WATERSHED INVESTIGATION (WI) -- A preliminary study of possible PL 566 projects to identify the potential for full development of water and related land resources. A watershed investigation report will be used to determine that watershed developments proposed for early action programs or other departmental authorization are feasible. The investigations and data provide an adequate basis to support and justify a request for authorization.

WATERSHED PLANNING UNIT (WPU) -- Topographically-defined watersheds of varying sizes that are the basic unit for planning purposes in forested areas of this study.

WESTERN U.S. WATER PLAN STUDY -- An investigation to develop a comprehensive water resources development plan to meet the projected water needs of the eleven western states which lie wholly or partly west of the Continental Divide. Authorized by Titles I and II of the Colorado River Basin Project Act of 1968 (PL 90-537). The Secretary of the Interior is responsible for the study being conducted by Bureau of Reclamation with cooperation and assistance of the Western States, other federal agencies, and other water resource planning groups.

APPENDIX IV - PUBLIC PARTICIPATION PLAN

INTRODUCTION

The Public Participation Plan adopted by the Field Advisory Committee included a series of public meetings to be held in the Basin early in the study.

These public meetings were held November 14, 15, and 16, 1972 in Bakersfield, Fresno, and Los Banos to inform the public about the San Joaquin Valley Basin Study and to solicit input in the study in the form of local objectives and problems.

The program consisted of an introduction by Carl Stetson, DWR; a 35 minute narrated slide presentation by Darwyn Briggs and Lyle Klubben; and after a break to collect the attendance forms and review the written questions, a question and answer period.

Carl Stetson served as moderator and he, Bob McKusick, Lyle Klubben, and Darwyn Briggs responded to the questions and comments.

There were 350 meeting notices mailed out to the general public, special interest groups, and federal and state agencies announcing the meetings. The announcement was made on radio and TV, and was also published in the Basin's newspapers. The interests of those attending the meetings were very diverse, including irrigation districts, local councils of government, Wilderness Society, Audubon Society, Pacific Gas and Electric, University of California, Fly Fishermen of America, Water Quality Control Board, Bureau of Reclamation, Bureau of Sport Fisheries, Resource Conservation Districts, and many others. All

meetings were covered by local newspapers. The Fresno meeting had TV coverage, and the Los Banos meeting had radio coverage.

The purpose of this Appendix is to summarize what took place at the meetings and to make it a part of the Plan of Work.

An abbreviated version of the text used in the slide presentation at the public meetings is contained on pages 3-14 of this Appendix. Following that is a brief summary of the nature of the questions asked by the public and the responses made by Mr. Stetson and the USDA staff members.

Additional public meetings will be planned in order to seek guidance from the public in the preparation of the watershed investigation reports and the alternative solutions described on pages 42 and 43 in the Activities and General Procedures section of this Plan of Work.

SUMMARY OF SAN JOAQUIN PUBLIC MEETINGS

I. Introduction

Carl Stetson, District Engineer for the Department of Water Resources at Fresno, served as the moderator at each of the three meetings. His introduction of the meeting included comments concerning the meetings' purpose, a brief discussion of the way in which the study came about, a brief description of the Water Resource Council's multiple objective planning system being employed in the study and a brief description of the expected results of the study. In this regard, he emphasized that the study was action oriented, yielding both project and program solutions to local problems. Mr. Stetson then introduced Bob McKusick, Lyle Klubben, and Darwyn Briggs of the USDA River Basin Staff who made the following slide presentation.*

II. Description of Study Area

The study area contains about 18.2 million acres. At present, about 5 million of that is cropland, 200,000 acres urban and industrial land, 7 million acres range, and 6.7 million acres forest and brush. Because of multiple use of some acres, the acreages shown add to more than 18.2 million acres.

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*This is an abbreviated version. The complete text is available from the State Conservationist, Soil Conservation Service, 2020 Milvia Street, Berkeley, CA 94704.

About 2/3 of the area is privately owned; 5.8 million is federally owned; and the balance, about 400,000 acres, state or municipally owned.

III. System of Study

This is a four-phase study. First, the objective and goals are set with input from local, state, and national public interests. Second, inventories of resources, problems, and needs are then made. Third, based on the above, alternative solutions to the problems and means of meeting the needs are formulated and evaluated. Finally, a course of action in the form of projects and programs will be selected through public meetings by the local people, who will then initiate action for implementation.

IV. Objectives and Study Detail

The study objectives are: to help alleviate social and economic difficulties associated with resource problems; to satisfy needs in the Basin through project and program type solutions available under USDA authority; and to formulate alternative solutions with the aid of the local people. Then a solution may be selected with a good understanding of its impact on the economy and the resource base. The local people then may initiate action for its installation.

The study will be of sufficient detail to identify social and resource problems and determine their general location and magnitude.

After the objectives have been set, the inventory phase is the next step.

V. Inventories

Inventories fall into two categories: problems and needs, and resources.

In doing an inventory of problems and needs, we first identify those which we know to exist and which have been identified through other studies.

A. Problems and Needs

1. Agricultural Cropland

Recent inventories by federal and state agencies have revealed there may be a need to improve drainage on about 330,000 acres of irrigated cropland.

These same studies have shown that with full development of the Basin's irrigable lands, 1,700,000 acres would eventually require project drainage improvements. More than 2.1 million acres or nearly half of the 4.3 million acres within the project area currently under irrigation are in need of improved irrigation management.

2. Flooding

Flooding is a major problem in the Basin. In 1969, the worse year of recent record, over one million acres were flooded

and an estimated $95 million of damage occurred. About 53 million of that to agricultural lands, 24 million to public facilities, over 15 million to urban-industrial facilities, and the balance about 3 million to forest and range resources and facilities.

3. Erosion and Sedimentation

Serious problems of erosion have been identified on nearly 400,000 acres.

4. Urban-Industrial

Much of the 170,000 acres that have been developed for urban and industrial uses were once "prime" agricultural land. This use is projected to increase to about 360,000 acres by the year 2020. Its impact on cropland should be considered well in advance of loss to development. About 100,000 additional acres of land are expected to be converted to second-home use by the year 2020. This latter will probably impact forest and range land more than cropland.

5. Socio-Economic Problems

In the area of socio-economic problems, both unemployment and low-income among employees and self-employed persons (including farm operators), are present problems in the Basin.

In the agricultural economics sphere, there are special problems relating to high costs of obtaining irrigation water and disposing of agricultural drainage effluent.

Also, there are significant costs involved in reclaiming land that is saline or alkaline.

One socio-economic problem in the basin is that the existence of many small family farms is threatened by a narrowing of their profit margins.

6. Fish and Wildlife

The problems of fish and game center around satisfying, insofar as possible, the demands placed upon the resources. To do so requires developing new fish habitat in the canals and aqueducts in the valley, obtaining maximum waterfowl, deer, and upland game production wherever possible by improving game habitat, utilizing private lands to bolster fish and game supplies, achieving better utilization of game by more realistic game laws and better access to both public and private lands, and ameliorating the adverse effects of water development upon fish habitat.

Special measures are needed to protect and enhance rare and endangered species such as the tule elk and the San Joaquin kit fox.

7. Wildfires

Wildfires burn, or severely damage, the vegetation on about 35,000 acres annually, most of it in the foothills and mountains. As the population increases and land use becomes more intensive, both numbers of fires and acreage burned are expected to increase.

8. Recreation

The San Joaquin Basin is well endowed with lands that are attractive to recreationists, particularly for activities that utilize mountainous terrain. It appears that these mountain areas, with large national forest and national park acreages, contain enough area to satisfy mountain-based recreation demands. However, there is a need to investigate conflicts between recreation and other uses, suitability and capability of the land to support various types of recreation use, location of facilities in relation to demands and the place of the private sector in helping to satisfy recreation needs.

With regard to recreation near population centers, the California Framework Study found that critical shortages for recreation near population centers exist now and are projected to grow worse. These projected shortages are

expected to have a greater effect upon low income groups. The same general type of investigation is needed for these lands as for the mountainous areas.

9. Timber and Grazing Management

The basin contains almost 1.7 million acres of commercial forest land, located in the mountainous areas on both privately owned and public lands. About 350 million board feet of sawtimber is harvested from the area annually. Much of this timber land is well stocked and producing timber at near maximum sustained yield rates. However, a substantial acreage is non-stocked or understocked.

Grazing is a major, though not always exclusive, use on over 7 million acres of land, over 80% of which is privately owned. They produce over 1 million animal unit months of grazing annually. Total livestock production in the Basin, (including feedlots) involves over 1 million cattle and about 400,000 sheep.

For both timber and forage producing lands, there is a need to evaluate suitability and capability of the land for these uses, the effects of encroachment by other uses, programs to increase productivity, present and potential production in relation to the demand, and alternative methods of meeting demand.

In summary, each of the above have closely related environmental problems which will be identified and evaluated as an integral part of the multiple objective planning process.

B. Resources

In order to identify the supply of resources that can be used to satisfy the needs and projected needs of people, it is necessary to do a complete inventory of the present status of those resources.

There are two types of natural resources; those that are practically non-renewable and those that are renewable.

Our inventory of present resources will include maps and tabulations of soils, grouped into associations with similar characteristics; present vegetation on the non-agricultural lands; present land and water use; and land ownership and administration.

We will also inventory the resources that are dependent upon the basic resources. These include recreation sites, fisheries, wildlife habitat, commercial timber sites, wilderness, and perhaps others.

The inventory phase will remain flexible throughout the study. We will add and subtract problems, needs, or resource inventory items as further evaluations prove them to be more or less important.

VI. Develop Alternative Solutions

In order to have available a wide array of solutions to the above problems, and in order to meet the study objectives, the public decision makers must have available alternative solutions and evaluations of their impacts on the economy and the environment.

A multiple objective planning concept which has recently been proposed by the Water Resources Council provides a means of developing and evaluating such alternatives in environmental, social, and economic terms. The concept presented in the Federal Register dated December 21, 1971 will be employed in this study.

At least three alternatives will be considered. Each would consist of specific projects and programs selected to meet three basic objectives.

An alternative to enhance the regional development objective might increase the income, employment, capital improvements, economic base, and enhance the environment and quality of life of the local areas.

A second alternative would consider ways to improve environmental quality. This might be aimed at enhancing the environment by management, conservation, preservation, creation, restoration, or improvement of the quality of natural and cultural resources in the ecological system.

A third alternative would consider a national economic development objective. This would consider ways of increasing the value of the Nation's output of goods and services and improving national economic efficiency.

Perhaps the best solution would incorporate elements of all three alternatives.

VII. Selection of Early Action Plan

Finally, a local action plan is selected. The local people will be able to select their action plan from an array of alternative projects and programs.

The action plan components should complement each other, and priorities for the installation of projects and the application of needed programs must be assigned as a part of the plan formulation. Both the selection of the components and their implementation rest with the local people.

Among the components of this plan would be those potential small watershed projects which are identified during watershed investigations as being feasible for construction. The impact of these potential projects as well as all other projects and programs in the action plan will have been evaluated in economic and environmental terms.

The plan may be implemented in a number of ways:

A. Projects and/or programs can be authorized for implementation individually.

B. Groups of projects can be authorized for planning and implementation.

C. Perhaps the best method to assure the orderly implementation of all needed projects and programs might be an authorization for the implementation of the entire action plan.

VIII. USDA Project and Program Opportunities Available

Among these are the Agricultural Stabilization and Conservation Service's Rural Environmental Assistance Program* and programs of the Farmers Home Administration, the Agricultural Extension Service, the Forest Service, and the Soil Conservation Service.

IX. Projects and Programs of Other Agencies

The implementation of some of the selected solutions may best be installed under authorities of agencies outside USDA.

These might include authorities of the California Department of Water Resources, U.S. Army Corps of Engineers, U.S. Bureau of

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*Program funding terminated December 22, 1972.

Reclamation, Environmental Protection Agency, U.S. Department of Housing and Urban Development, and many others.

The solutions to be implemented under the authorities of the above agencies will be outlined in less detail in this study than those to be implemented under USDA authorities.

Following the above presentation Mr. Stetson then called for a short break during which the attendance sheets including written questions to the participants were collected.

When the meeting resumed, Mr. Stetson read the written questions, and he and the USDA staff members replied.

One important concern expressed at each meeting centered on the possibility of a duplication of effort with other studies.

Mr. Stetson and the staff pointed out their awareness of the other on-going studies and that a work group of the Task Force for Planning Coordination was providing state-federal coordination.

Another concern expressed was that of developing potential agricultural drainage projects without the completion of the State's master drain. The staff response was that the drainage projects currently under study on the westside are being developed so that their drainage effluent can be utilized as an irrigation water supply for the grasslands area. It was also pointed out that the current impasse concerning the funding of

the master drain could only be broken through local interest which should be increased with the study's investigation of drainage project possibilities.

Several people were interested in continuing to participate in the study and asked when additional public meetings would be held. The staff replied that it was willing to meet with any interested groups in the Basin. The next scheduled meeting would be in the Spring 1973 in Los Banos where an advance draft of the first six watershed investigation reports would be presented to the potential project sponsors and other interested groups and organizations. Review comments on the national, regional, and environmental impacts of the projects will be sought at this meeting.

The next Basinwide series of meetings is planned at the end of the inventory stage and just prior to alternative solution formulation. This is expected by the fall of 1973.

There was interest expressed in the specific outputs of the study. Mr. Stetson and the staff reemphasized that the study was aimed at producing with local input alternative solutions to the local problems from which the local people might develop their action plan. Watershed investigation reports were cited as examples of project type alternative solutions. A number of programs were also described as likely components of the local action plan.

At one meeting it was suggested that the "new environmentalists" should be excluded from the study effort. The staff responded that we

need to include all people from the start so that all interests will be represented in the alternative formulation and local action plan selection stages.

One question concerned the need for environmental impact statements for the proposed PL 566 projects. The response indicated that these statements are a regular part of the planning process and that the data contained in the environmental quality alternative would be the prime source of data for these statements.

SAN JOAQUIN VALLEY BASIN STUDY

UNITED STATES DEPARTMENT OF AGRICULTURE
River Basin Planning Staff
2020 Milvia Street
Berkeley, California 94704

October 16, 1972

This is a personal invitation for you to become a part of the solution to the Basin's resource problems.

The San Joaquin Valley Basin Study conducted by the U.S. Department of Agriculture will be the subject of three public meetings.

These meetings will provide an opportunity for you or your organization to become acquainted and perhaps involved in this important study being conducted at the request of the California Department of Water Resources in response to local interest.

The meeting will provide an opportunity for you to make important contributions to the initial phase of the study's goals and objectives.

The date, time, and location for the meetings are:

November 14, 1972, 1:30 p.m.
Police Auditorium
1620 Truxtun Avenue
Bakersfield

November 15, 1972, 1:30 p.m.
County Library Building
Sarah McCardle Room
2420 Mariposa
Fresno
(N Street entrance on 2nd floor)

November 16, 1972, 1:30 p.m.
Los Banos Floral Building
Los Banos Fairgrounds

We hope to involve you at this early time so that the study will fulfill local needs.

Please note that the study is action oriented, that is, solutions of a project and/or program nature will be developed and implemented through the cooperation of the local leaders.

SAN JOAQUIN VALLEY BASIN STUDY

UNITED STATES DEPARTMENT OF AGRICULTURE
River Basin Planning Staff
2020 Milvia Street
Berkeley, California 94704

November 6, 1972

This is a reminder that the U.S. Department of Agriculture and the California Department of Water Resources are holding three meetings to inform the public on their San Joaquin Valley Basin Study.

The date, time, and location for the meetings are:

November 14, 1972, 1:30 p.m.
Police Auditorium
1620 Truxtun Avenue
Bakersfield

November 15, 1972, 1:30 p.m.
County Library Building
Sarah McCardle Room
2420 Mariposa
Fresno
(N Street entrance on 2nd floor)

November 16, 1972, 1:30 p.m.
Los Banos Floral Building
Los Banos Fairgrounds

The enclosed brochure will provide some background information on the study.

We are looking forward to seeing you at these meetings, and encourage you to take an active part in them.

Any questions concerning these meetings or the study in general may be directed to:

G. H. Stone, Chairman
Field Advisory Committee
U.S. Department of Agriculture
2020 Milvia Street
Berkeley, California 94704
Phone (415) 841-5121, Ext. 391

UNITED STATES DEPARTMENT OF AGRICULTURE
River Basin Planning Staff
2020 Milvia Street
Berkeley, California 94704
Phone (415) 841-5121, Ext. 571

NEWS NEWS NEWS

FOR RELEASE NOVEMBER 6, 1972:

G. H. Stone, State Conservationist for the Soil Conservation Service, announced today that the U.S. Department of Agriculture and the California Department of Water Resources are holding three public meetings to discuss a water and land study of the San Joaquin drainage being conducted by the two agencies.

The meetings are being held at 1:30 p.m. at the following locations: On November 14 at the Police Auditorium, 1620 Truxtun Avenue, Bakersfield; November 15, County Library Building, Sarah McCardle Room, 2420 Mariposa, Fresno; and on November 16 at the Floral Building, Los Banos Fairgrounds, Los Banos.

"The USDA's Economic Research Service, Forest Service, and Soil Conservation Service are responding to a request for assistance by local citizens through the Department of Water Resources," Stone said.

The purpose of the meetings is to inform the public of the study, and to solicit its guidance in setting the study's goals and objectives. Therefore, all interested citizens are encouraged to attend and participate in these meetings.

According to Stone, "The study is aimed at providing the local people alternative solutions to resource problems from which they will choose their own action plan. Special emphasis is being placed on identifying those problems which can be solved by local action through the USDA's project and program authorities."

He pointed out that "specific project opportunities are being identified through watershed investigations in sufficient detail to allow local sponsoring organizations to request design and construction authority from the USDA."

For information concerning the meetings and the study in general contact:

G. H. Stone, Chairman
Field Advisory Committee
U.S. Department of Agriculture
2020 Milvia Street
Berkeley, California 94704
Phone (415) 841-5121, Ext. 391

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San Joaquin Valley Basin Study
Public Meetings
November 14, 15, & 16, 1972

Name_____

Address_____ _____ _____ _____
(Street or P.O. Box) (City) (State) (Zip)

Representing_____
(Organization or Agency)

Do you wish to receive future progress reports on the Study? Yes____ No____

Do you have comments you wish to make today concerning the Study? Yes____ No____

Do you have questions you wish to ask today concerning the Study? Yes____ No____